



MODULE 04 | TEACHER GUIDE

Baykeepers

Save the Living Bay | English B2–C1 | Ages 15–18 | 60–90 minutes

Students act as coastal advisers. They construct a food web, compare the effects of habitat damage and local organism loss, and defend a conservation plan. An exhibition poster combines an accurate visual with a qualified recommendation.

Learning outcomes

Students can distinguish feeding links from habitat dependence, explain direct and indirect effects, and compare affordable interventions. B2 learners use supplied reasoning frames; C1 learners test assumptions and respond to counterarguments.

Lesson sequence

Time	Activity	Result
0–5 min	Ask: Can a tiny organism matter as much as a large animal? Read the mission on p. 2.	Initial ideas
5–13 min	Read the science brief and glossary together. Check the example arrow.	Shared vocabulary
13–28 min	Use p. 3 and the cards on pp. 4–5 to build the food web.	Eight-card network
28–40 min	Work through the two events on p. 6. Reset before Event B.	Cause-and-effect notes
40–55 min	Choose a plan and design the mini-poster on p. 7.	Conservation message
55–60 min	Pair teams. Explain one link and one reason for your plan.	Peer questions

Preparation and support

Print pp. 2–7 for each team of four. Print pp. 4–5 single-sided and cut on the dashed lines. Retain p. 8 for the teacher. Supply two A3 sheets, pens and eight small paper markers. Use the first A3 sheet for the food web and the second for the poster.

Roles: evidence reader, network checker, critical questioner and spokesperson. B2 support: annotate the glossary and rehearse with the frames. C1 extension: challenge assumptions rather than merely adding detail. Cards represent selected organisms or groups, not eight separate species; illustrations are not to scale.

Optional extension to 90 minutes

Add 15 minutes for a peer challenge and poster revision. Add 15 minutes for a 160–200-word council briefing comparing the chosen package with one alternative and explaining how progress would be assessed.

This fictional bay and its event rules are classroom models. They do not predict population numbers or automatic extinction. No live organisms, field collection, online accounts or public posting are required.

Ocean Literacy links: principle 5, the ocean supports diverse life and ecosystems; principle 6, people and the ocean are connected. Scientific background and suggested answers appear on p. 8.



STUDENT SHEET 1 | YOUR MISSION

Small lives matter

A coastal council must decide how to protect its bay. Residents value familiar birds and fish, but less visible organisms also support the ecosystem. Your team must explain these connections, assess two damage scenarios and recommend a realistic plan within a limited budget.

Read before you play

An ecosystem includes organisms, their physical surroundings and their interactions. Habitats provide the conditions organisms need. Biodiversity includes variation within species, between species and between ecosystems. A short organism list captures only part of this variety.

Producers such as algae use sunlight to make food. Consumers obtain energy by eating other organisms. In a food web, arrows run from food to consumer: phytoplankton → zooplankton shows the direction of energy transfer. Several chains can overlap within the same web. [1]

Feeding links are only part of the system. Seagrass, a marine flowering plant, can provide shelter and feeding areas for fish and invertebrates. It differs from seaweed, which is algae. Habitat structure matters even when the plant is not a listed food source. [2]

Habitat damage may reduce shelter or feeding opportunities. Moving elsewhere might help, but suitable space and food are not unlimited. A consumer with several prey types may switch foods; that response can affect other consumers. Such effects are possibilities to investigate, not automatic outcomes.

Our model

The eight cards represent selected organisms or groups. Use their listed diets to construct this model, while recognising that real diets and habitat use vary with age, season and location. The codes S, R and O are simplified habitat assignments for this fictional bay.

Seagrass is included as habitat, not as a separate food card. Decomposers and dead material are omitted, although decomposition helps recycle nutrients. The model also lacks population sizes and feeding rates. Explain how these gaps limit what you can conclude. [1]

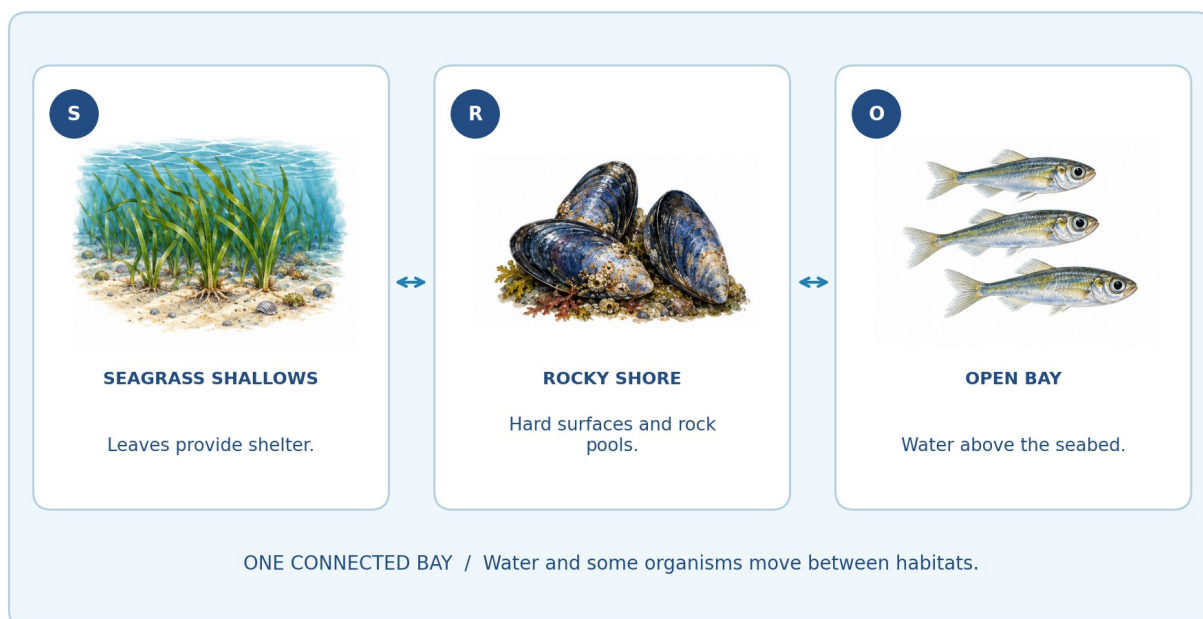
Key concepts

Concept	Meaning
dependency	A relationship in which one organism relies on a resource or condition.
compensation	An alternative that partly replaces a lost resource or function.
indirect effect	A change transmitted through another relationship.
opportunity cost	The benefit forgone when another option is chosen.
confounding factor	Another influence that could explain an observed change.

Explain why an organism with no obvious appeal to visitors might still deserve protection. Use one ecological reason.

STUDENT SHEET 2 | BUILD THE BAY

Connect the living world



A schematic habitat board, not a map to scale. S, R and O are habitat codes on your cards. A card may use more than one habitat.

Round 1 Build your food web

- 1 Allocate two cards to each person and share their information.
- 2 Write all eight card numbers and names on A3. Identify the producers.
- 3 Draw every listed food-to-consumer link. Add habitat codes separately.
- 4 Trace two different routes from a producer to the heron. Explain which organisms connect those routes.

Check the convention: 01 → 03 means that zooplankton consumes phytoplankton. It does not show the direction of animal movement. Water can carry plankton from O to mussels at R.

Check your network

Which consumers have two listed foods? Explain one potential benefit and one limit.
Which organisms use S? Why might the remaining habitat fail to replace it fully?
C1: identify one missing relationship that could change your interpretation.

Language help

"The model suggests ... because ..."
"An alternative resource may help, provided that ..."
"We cannot conclude ... from these cards alone."
C1: "This interpretation depends on the assumption that ..."

Distinguish a relationship explicitly shown by a card from a possible consequence inferred by your team.

STUDENT SHEET 3 | CUT-OUT ORGANISM CARDS

The start of the food web

01



PHYTOPLANKTON

PRODUCER / HABITAT O

Microscopic drifting algae. Photosynthesis supports consumers even when these producers are difficult to see.

Food link: no food card needed.

Tiny does not mean unimportant.

BAYKEEPERS / LIFE IN THE BAY

02



SEAWEEDS

PRODUCER / HABITAT R

Attached macroalgae convert sunlight into food. Their structure can also shelter small organisms.

Food link: no food card needed.

They also give small animals shelter.

BAYKEEPERS / LIFE IN THE BAY

03



ZOOPLANKTON

CONSUMER / HABITAT O

Drifting animal plankton. This profile represents grazers that transfer energy from algae to predators.

Eats in our model: 01.

Many larger animals depend on tiny food.

BAYKEEPERS / LIFE IN THE BAY

04



BLUE MUSSELS

CONSUMER / HABITAT R

Attached filter feeders that obtain suspended food from water. Their feeding links habitats through water movement.

Eats in our model: 01.

Water can carry food to an animal.

BAYKEEPERS / LIFE IN THE BAY

Cut along the dashed lines. S = seagrass shallows; R = rocky shore; O = open bay. The artwork shows examples of each group and is not to scale.

STUDENT SHEET 4 | CUT-OUT ORGANISM CARDS

Small animals and their hunters

05



AMPHIPODS

CONSUMER / HABITAT S + R

Small crustaceans associated with vegetation and rocks. Some graze algae and consume detritus, or dead material.

Eats in our model: 02.

They are food for fish and crabs.

BAYKEEPERS / LIFE IN THE BAY

06



SHORE CRABS

CONSUMER / HABITAT S + R

Mobile omnivores with several potential foods. Losing prey may alter feeding choices without causing immediate disappearance.

Eats in our model: 04 and 05.

Losing one food source may change a diet.

BAYKEEPERS / LIFE IN THE BAY

07



SMALL FISH

CONSUMER / HABITAT S + O

Represents fish feeding on small invertebrates. Food availability and access to protective habitat are separate dependencies.

Eats in our model: 03 and 05.

Open water does not offer the same shelter.

BAYKEEPERS / LIFE IN THE BAY

08



GREY HERON

CONSUMER / HABITAT S + R

A shallow-water predator whose diet includes fish. Changes below water may affect its feeding opportunities.

Eats in our model: 07.

A bird can depend on life below water.

BAYKEEPERS / LIFE IN THE BAY

These cards show selected feeding links. They are not full diets or complete habitat lists. Use the card numbers to build and check your web.



STUDENT SHEET 5 | EVENT ROUNDS

What changes when a habitat is lost

Event A Damaged seagrass

In our fictional bay, repeated boat anchoring damages the seagrass meadow. For this round, treat S as unavailable. Cover S on every card that uses it. Add a small warning marker to those cards. Keep the food arrows for now.

- 1 Identify the cards affected and their remaining habitat.
- 2 Explain one function that the alternative may not replace.
- 3 Identify one condition that would make relocation more or less successful. Do not equate habitat loss with automatic death.

Card number	Other habitat	Function at risk and a condition
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

"Although ... can also use ..., this may not provide enough ..."

Reset your bay

Uncover S and remove all warning markers. Event B is a separate scenario. Do not carry damage from Event A into Event B.

Event B Mussels disappear locally

Construction removes the mussel-covered surface in part of the rocky shore. For this simplified round, take card 04 out of the food web and cross out its food arrows. All other cards stay. This represents local loss, not global extinction.

- 1 Identify the consumer that loses food and its remaining resource.
- 2 Explain a possible indirect effect on fish and then the heron. Give an alternative outcome.
- 3 C1: what evidence would help distinguish these outcomes? Avoid presenting either as certain.

Propose one repeated measurement and a comparison site. Explain why a single count after the event would be weak evidence.



STUDENT SHEET 6 | THE PROTECTION CHALLENGE

Make a case for the whole bay

Choose two or three actions costing no more than six tokens. Costs are invented for this activity. Consider both disturbances and compare your package with one affordable alternative. Explain a benefit, an opportunity cost and how you would review progress.

Action	Cost	Benefit and limit
A Protect seagrass	3	Create a marked no-anchor zone. Reduces future anchor damage; does not instantly regrow lost plants.
B Protect rocky habitat	3	Change construction plans to avoid living rocky surfaces. Protects habitat; building work may need a different design.
C Survey the bay	2	Count selected organisms and map habitats regularly. Helps check change; does not directly stop damage.
D Inform visitors	1	Create signs and a short guide about wildlife. Helps people understand; results depend on their actions.

Our actions: _____ Total: _____ / 6 tokens.

We chose them because: _____

One problem they do not solve: _____

Create a mini-exhibition poster

Create an exhibition poster on your second A3 sheet. Include:

- One habitat and at least three organisms connected by correct arrows.
- An 80–110-word argument linking a possible impact to your plan.
- One rejected alternative and a reason for rejecting it.
- One measurable indicator and a realistic review method.

You can choose three organisms from a longer chain. Your poster is a small example, not the whole food web.

Argument support

"We recommend ... because the model shows ... This may ... However, ... We rejected ... because ... We will monitor ... by ..."

C1: qualify your recommendation with a condition rather than adding a general disclaimer.

Gallery conversation

Present your poster to another team in 90 seconds. Ask: "Which conclusion is supported directly?" and "Why is your plan preferable to the alternative?" Revise one claim after the discussion.

C1 challenge: explain why monitoring alone cannot replace protection, and why protection without monitoring may also be difficult to evaluate.



TEACHER SHEET | ANSWERS AND SOURCES

Connections and suggested responses

Food web and habitats

Producers: 01 and 02. Eight feeding arrows: 01 → 03, 01 → 04, 02 → 05, 03 → 07, 05 → 07, 04 → 06, 05 → 06, 07 → 08. Example chains: 01 → 03 → 07 → 08 and 02 → 05 → 07 → 08. Cards 06 and 07 each have two listed foods. Accept only listed links for checking this model; real webs include many more. [1, 3–5]

Habitat S: 05, 06, 07, 08. Their remaining habitats are R, R, O and R respectively. Losing S can reduce shelter or feeding opportunities even when another code remains. The codes describe this activity, not universal species requirements. Seagrass is a habitat-forming plant and producer, although it has no separate food card. [2]

Event reasoning

Event A: mark the four S cards; do not remove any organism automatically. Movement may help, but alternative places may have less space, food or suitable shelter. Event B: remove 04 and arrows 01 → 04 and 04 → 06. Crab 06 still has amphipods 05. If crab feeding on amphipods increases, fish may have less of that food and herons could be affected through fish. This is a hypothesis, not a certain cascade: other prey, movement and population responses could change the outcome.

Alternative response: crabs may use other prey or relocate, while fish may rely more on zooplankton. Compare repeated organism counts and feeding observations at affected and reference sites, with matched timing and effort. A single later count cannot establish cause. Missing resource quantities mean that two prey links do not prove resilience.

Plans and sample poster text

A+B = 6 prioritises preventing physical damage but funds no survey or visitor guide. A+C+D = 6 supports seagrass protection, monitoring and information but does not directly change rocky-shore construction. B+C+D = 6 leaves the anchoring problem untreated. Other two- or three-action plans within budget are valid with reasons. Treat benefits as aims, not measured guarantees.

"We recommend protecting rocky habitat, surveying the bay and informing visitors for six tokens. The model links mussels to crabs and amphipods to both crabs and fish. Losing mussels could increase pressure on amphipods, although prey switching is not certain. Our plan protects habitat and checks change rather than assuming recovery. We rejected protecting both habitats because it would leave no budget for monitoring or information. However, anchoring remains a problem. We will compare habitat area and organism counts at the same affected and reference sites over time, using consistent methods. Unexpected deterioration would prompt a review."

Assessment

Award 0–2 each for network accuracy, direct and indirect reasoning, treatment of uncertainty, comparison of affordable plans and clear B2–C1 communication. B2: linked explanations and supplied frames are appropriate. C1: expect explicit assumptions, counterarguments and a justified review method.

Sources

- [1] NOAA. Aquatic food webs. <https://www.noaa.gov/education/resource-collections/marine-life/aquatic-food-webs>
 - [2] NOAA Fisheries. The Importance of Eelgrass. <https://www.fisheries.noaa.gov/feature-story/importance-eelgrass>
 - [3] MarLIN. Common shore crab. <https://www.marlin.ac.uk/species/detail/1497>
 - [4] MarLIN. A gammarid shrimp. <https://www.marlin.ac.uk/species/detail/1699>
 - [5] RSPB. Grey Heron. <https://www.rspb.org.uk/birds-and-wildlife/grey-heron>
- Last visited: 13 October 2026.