Action and Innovation: Litter Stopper

Teacher Guide

Coastcare Victoria School Kit

Coastcare Victoria

VICTORIA State Government | Energy, Environment and Climate Action

Acknowledgements

Coastcare Victoria would like to acknowledge all our video presenters and individuals who reviewed or assisted with the creation of the Coastcare Victoria School Kit.

Author

Coastcare Victoria and Ocean Imaging.

Photo credit

Ocean Imaging.

Acknowledgment

We acknowledge and respect Victorian Traditional Owners as the original custodians of Victoria's land and waters, their unique ability to care for Country and deep spiritual connection to it. We honour Elders past and present whose knowledge and wisdom has ensured the continuation of culture and traditional practices.

We are committed to genuinely partner, and meaningfully engage, with Victoria's Traditional Owners and Aboriginal communities to support the protection of Country, the maintenance of spiritual and cultural practices and their broader aspirations in the 21st century and beyond.

ISBN 978-1-76136-059-6 (pdf/ online/ MS word)

Accessibility

If you would like to receive this publication in an alternative format, please telephone the DEECA Customer Service Centre on 136186, email customer.service@delwp.vic.gov.au, or via the National Relay Service on 133 677 www.relayservice.com.au. This document is also available on the internet at www.delwp.vic.gov.au.

Contents

Curriculum Links

Year 5 and 6 Curriculum Area	C/ Code	Content Description	Elaboration / Link to this lesson/ Learning intentions.
Science / Science Understanding > Science as a human endeavour	VCSSU073	Scientific understandings, discoveries and inventions are used to inform personal and community decisions and to solve problems that directly affect people's lives.	Evaluate the design of eco lobster pots as a 'solution' to plastic pots and plastic waste. Collecting data on waste problems can be a powerful way to influence policies and drive change.
Science / Science Inquiry Skills > Recording and processing	VCSIS085	Construct and use a range of representations, including tables and graphs, to record, represent and describe observations, patterns or relationships in data.	Graphing up collected data and identifying relationships.
Science / Science Inquiry Skills > Communicating	VCSIS088	Communicate ideas and processes using evidence to develop explanations of events and phenomena and to identify simple cause-and-effect relationships.	Presenting data to persuade / convince of better use of materials to create litter solutions. Debate.
Geography / Geographical Concepts and Skills/ Place, space and interconnection.	VCGGC087	Describe and explain interconnections within places and between places, and the effects of these interconnections.	Researching connections between places as sources of plastics.
Geography / Geographical Concepts and Skills> Data and information	VCGGC089	Collect and record relevant geographical data and information from the field and secondary sources, using ethical protocols.	Creating maps to show connections between places.
Geography /Geographical Knowledge	VCGGK096	Environmental and human influences on the location and characteristics of places and the management of spaces within them.	Identifying local vs remote sources of plastic.

Design and Technologies / Creating Designed Solutions / Investigating	VCDSCD038	Critique needs or opportunities for designing, and investigate materials, components, tools, equipment and processes to achieve intended designed solutions.	Research and design eco project to eliminate plastic.

Year 7 and 8 Curriculum Area	C/ Code	Content Description	Elaboration / Link to this lesson/ Learning intentions.
Science / Science Understanding > Science as a human endeavour	VCSSU090	Science and technology contribute to finding solutions to a range of contemporary issues; these solutions may impact on other areas of society and involve ethical considerations.	Design of eco lobster pots as a 'solution' to plastic pots and plastic waste. Design activity for students to design their own eco project to eliminate plastic. Collecting data on waste problems can be a powerful way to influence policies and drive change.
Science / Science Inquiry Skills > Recording and processing	VCSIS110	Construct and use a range of representations including graphs, keys and models to record and summarise data from students' own investigations and secondary sources, and to represent and analyse patterns and relationships.	Graphing up collected data and drawing conclusions from results.
Scienc e/ Science Inquiry Skills > Communicating	VCSIS113	Communicate ideas, findings and solutions to problems including identifying impacts and limitations of conclusions and using appropriate scientific language and representations.	Presenting data to persuade / convince of better use of materials to create litter solutions.
Geography / Geographical Concepts and Skills> Data and information	VCGGC102	Collect and record relevant geographical data and information from the field and secondary sources, using ethical protocols	Identifying local vs remote sources of plastic. Creating maps to show connections between places
Geography / Geographical Concepts and Skills> Place, space and interconnection.	VCGGC103	Describe and explain interconnections within places and between places, and the effects of these interconnections.	Use evidence to investigate the source of marine plastics

Geography / Geographical Knowledge / Place and liveability	VCGGK111	Factors that influence the decisions people make about where to live and their perceptions of the liveability of places	Joining local volunteer groups can be a powerful way to contribute to the liveability of local places and communities.
Geography /Geographical Knowledge > Place and Liveability	VCGGK115	Strategies used to enhance the liveability of places, especially for young people	Brainstorming / researching ways to enhance liveability of the area and get involved.
Design and Technologies / Creating Designed Solutions / Investigating	VCDSCD049	Critique needs or opportunities for designing and investigate, analyse and select from a range of materials, components, tools, equipment and processes to develop design ideas	Research and design eco project to eliminate plastic.

Cross Curriculum Priorities	C/ Code	Content Description	Elaboration / Link to this lesson/ Learning intentions.
Sustainability > Futures		Sustainable futures result from actions designed to preserve and/or restore the quality and uniqueness of environments.	Joining local volunteer groups can be a powerful way to contribute to the liveability of local places and communities.
Sustainability > Futures		Actions for a more sustainable future reflect values of care, respect and responsibility, and require us to explore and understand environments.	Designing plastic free alternatives to everyday items can be beneficial to the environment

Key Themes:

Plastic pollution, plastic free alternatives, using data to drive change, citizen science.

Learning intentions

Students will understand:

- Plastic continues to be a big threat to coastal and marine wildlife.
- Collecting data on waste problems can be a powerful way to influence policies and drive change.
- Litter Stopper is an efficient and useful app to use to document waste.
- Designing plastic free alternatives to everyday items can be beneficial to the environment.
- Joining local volunteer groups can be a powerful way to contribute to the liveability of local places and communities.

Success Criteria

Students are able to:

- Use data to test the effectiveness of a plastic free solution.
- Design and evaluate the effectiveness of a simple scientific study.
- Use an Excel spreadsheet to calculate averages and compare results from a scientific study.
- Use evidence to investigate the source of marine plastics.
- Visually represent data to communicate a research finding.

Background

Eco defender Colleen Hughson has been collecting and documenting litter in her area over the past 5 years. It all started when she started finding plastic-stemmed cotton buds washing up on her local Warrnambool shores. By using a data and evidence-based approach to action, Colleen and her team at Beach Patrol 3280-3284 successfully managed to change policy which has resulted in a statewide ban of plastic-stemmed cotton buds - directly as a result of their data.

In recent times, Colleen has shifted her focus to other forms of waste issues in her local area. After looking through her data, it was clear that fishing debris was one of the most frequently washed up materials on the local beach. A lot were hard remnants that were just broken up bits of plastic. Much of this had a distinct red colour. After using her detective skills, Colleen found out that this red plastic was coming from the local rock lobster pots.

So she thought, what could be done? She was introduced to local rock lobster fisher Gary. After sharing evidence in the form of data and imagery, Gary was convinced there was a problem and decided to help out with a solution. A self-proclaimed tinkerer by nature, Gary looked at designing a new rock lobster pot that was plastic free. The pots are not only better for the environment, but Gary believes also have superior catching capabilities.

In this video students are introduced to Colleen, Gary and the Litter Stopper app that supports groups and individuals to collect data about litter and share it accurately and effortlessly with other interested parties to influence policy makers and ultimately protect the environment we all live in. By recording data, students will

develop a better understanding of the litter situation, what needs to be done to control it and increase their awareness of the situation.

Beach Patrol is a network of volunteer groups using the power of community spirit to clean local beaches and streets. The groups have created an app to help people record information from your clean-up activities. By documenting the litter being collected, people are helping to map ocean litter along our coastlines. Ultimately the goal is to stop it at its source.

The Litter Stopper app supports groups and individuals to collect data about litter and share it accurately and effortlessly with other interested parties. This information is incredibly important as it can help to provide evidence to influence policy makers. Litter Stopper records up to 32 of the most commonly littered plastic items. Once the items have been entered, another copy is stored on a common database which can be found on LitterStopper.com. The information on the database is available for anyone to see or download. A summary page on LitterStopper.com also highlights the frequency for which each item is counted.

Four options are available to select from:

- **No sorting clean only** - For this option only count the number of bags of rubbish and how many kilograms were collected.
- **Standard clean** - For this option count how many bags and kilograms were collected and then sort the drink bottles and cans and coffee cups and lids and count those too. This type of data is aimed at supporting container deposit schemes and raising awareness of the high number of littered coffee cups.
- **Full audit clean** - In this option collect the bags and weigh how many kilograms were collected then sort it into the 32 different categories. This can take some time to perform.
- **Partial audit clean** - In this option select a subset of the full audit of 32 items. So, for example, someone may only want to search for bottle tops, straws and plastic bottles. This option allows only those items to be counted. The other non-selected items will be greyed out, not allowing them to be counted and recorded.

Resources

- Video
- Video Transcript
- Presentation Slides - Action and Innovation: Litter Stopper
- Quiz PDF
- Illustrate the Find Data
- List of Litter Collected
- Litter Data for Analysis
- Litter Stopper Database (may take some time to load)
- Pinpointing the Problem Worksheet PDF
- Pinpointing the Problem Worksheet answers
- Pin Pointing the Problem - Litter Collection Data
- Rock Lobster Experiment Visual Data
- Rock Lobster Experiment Data Sheet
- Litter Stopper Review Questions
- Litter Stopper Glossary

Extra links

- Coastcare Website with Virtual Map
- Landcare Vic Website with Groups
- Conservation Volunteers Australia project search
- Supplementary video: Volunteer in Victoria's parks
- LitterStopper Website
- Litter Stopper Guide PDF
- LitterStopper Full Instructions
- Gary Ryan Radio Interview Transcript
- Tangaroa Blue Fact Sheets
- Tangaroa Blue Cause and Effect Resource
- Conservation Volunteers Australia events
- Supplementary Video 2: Plastic bottle lids cause and effect
- Notpla Sustainability Glossary
- Zooniverse

Lesson Plan

Activity 1: Quiz

After watching the video complete the Action and Innovation: Litter Stopper Quiz.

Activity 2 - Illustrate the Find

Colleen and her team at Beach Patrol 3280 teamed up with the Victorian Fisheries Authority to clean up Tea Tree Bay. In one day, they removed 108kg of litter. Students can use the litter list in the worksheets to create a poster that communicates what was found. Encourage them to form categories for the litter to help with the way the items are visually presented in the poster. Students may like to do the poster as a digital image or even a PowerPoint presentation.

Activity 3 - Testing the Solution

To begin this activity, you can have students see if they can design a way to test if the plastic free pots designed by Rob are as effective at catching rock lobster as the plastic ones.

Then use the Rock Lobster Experiment Visual Data to test if the plastic free pots were as effective at catching rock lobster as the plastic ones. You may like to have students design their own tables for collecting data, or use this pre-made excel data sheet. Have students graph up the results either digitally or on graph paper.

You can also access the Rock Lobster Pot experiment results. Essentially the data shows that for the 5 pots tested over 4 reefs over 3 months for both plastic and non-plastic pots - the average rock lobster caught was 1.98 for plastic and 2.08 for non-plastic. Therefore, the conclusion could be made that the non-plastic pots were slightly better at catching the rock lobsters.

At the conclusion of the experiment, have students think up ways that the experiment may have been flawed or could be improved. You may like to use these extension activities to introduce the contempt of outliers - data points that differ significantly from other observations.

Extension 1 - Use the data to find out if any of the individual pots were better or worse at catching rock lobsters than others?

Answer: Pot 4 plastic was a bit of an outlier with catching just an average of 0.75 rock lobster over the trials. Therefore, arguably the non-plastic ones could be considered more consistent. The best catching pot was Pot 5 non-plastic but only by a small amount.

Extension 2 - Use the data to find out if any of the reefs seemed to have more rock lobsters than others?

Reef 1 was the most productive reef with an average of 2.37 rock lobster per pot. Reef 2 and 3 were very similar with approximately 2.1 per pot and Reef 4 was the least productive with 1.53 rock lobster per pot.

Extension 3 - Was any month more productive than others?

January was the best month with an average of 2.15 rock lobster per pot. March was second best with an average of 2 and February the least successful month with 1.95.

Activity 4: Local Groups

In this activity students will use the following website links to research local groups and projects in their area:

Coastcare website with virtual map

Landcare vic website with more groups

Conservation Volunteers Australia project search

If there are no groups, you can have your students look up online citizen science projects at Zooniverse

Investigation 1: Pinpointing the Problem

In this investigation students will use Collection Data spreadsheet - a list of real data collected from the Warrnambool area from July 2017 to April 2021 to answer the questions from the Pinpointing the Problem Worksheet PDF. Note that they will need to click on the various tabs down the bottom of the excel sheet to access all the data.

Extension and to assist with question 15 in the worksheet - Show the students Supplementary Video 2: Plastic Bottle Lids Cause and Effect and discuss the origin of foreign bottles watching up on local shores. What could be done about the issue?

Investigation 2: Plastic Free Alternatives

Now that students have learned about the case study of a plastic free solution for crayfish pots, hopefully they feel inspired to come up with ideas to design plastic free alternatives to other local issues.

1. Use the Litter Stopper app to collect data around the school. This could also be organised as an excursion to a local beach or park. Students can choose one common piece of litter and try to work out the source.
2. If that is not possible, your class may like to use data from the previous investigation for ideas about problem items that they may like to redesign.

Use the presentation slides for this lesson and run through the 6 Ds to help with this investigation:

1. Define - What is your challenge? Read your brief carefully and write a definition of the tasks and challenges.
2. Discover - What makes a good plastic free alternative? Which other good examples are out there?
3. Dream - What items around the house or school could be designed better?
4. Design - How will the new product work? What materials will you need? How will it be cost effective?
5. Deliver - Draw a plan for your design. Label the sections and describe the features and benefits. Pitch your product to a friend or your teacher.
6. Debrief - What have you learned from this task? How did your creation compare to others?

Review Questions

Use the Litter Stopper Review Questions.

Glossary

Beach Patrol: a network of volunteer groups using the power of community spirit to clean local beaches and streets.

Brittle: hard but likely to break easily.

Citizen science: scientific work or data collection undertaken by members of the general public.

Cray pot: dome-shaped enclosed basket used for catching rock lobster.

Database: organised collection of data stored.

Debris: scattered pieces of rubbish or remains.

DEECA: Department of Energy, Environment, and Climate Action.

Environment: the surroundings or conditions in which a person, animal, or plant lives or operates.

Litter Watch: a citizen science-based app (similar to Litter Stopper) that aims to help fill data gaps in beach litter monitoring.

Liveable: comfortable or suitable for living.

Outlier: a data point that differs significantly from other observations.

Plastic: an umbrella term for a wide range of synthetic materials that can be shaped and moulded into a variety of items.

Pollution: when the environment is contaminated, or dirtied, by waste, chemicals, and other harmful substances.

Nurdle: a very small pellet of plastic which serves as raw material in the manufacture of plastic products.

Remnants: parts that are left over.

Shorebirds: birds that live on or frequent the shoreline.

Source: a place, person, or thing from which something originates or can be obtained.

Sustainability: meeting the needs of today without compromising future generations.

Toxic: poisonous or having a harmful effect.