

Activity Title:

Oil spills and the beach community

Focusing questions

How do oil spills like the one from the *MV Rena* affect the beach and plants and animals that live there?

How might the food-chain be affected by an oil spill?

How would impacts from the *MV Rena* spill differ if there was more oil or a different type of oil?

Resources required

- Case study - Oil spills, the *MV Rena* and the beach community - page 283
- 'Fill in the gap' cards - page 287
- Pen and paper
- Whiteboard

Prior learning

- 1c Beach diagram
- 2a Native dune plants – what lives where and why?
- 2g Animals and insects – who lives in the dunes?
- 2k Ecosystem relationships
- 4a The importance of sand dunes

Method

1. The objective of this activity is to explore the impacts of oil spills on beaches (including the effects on dune communities that live there).
2. Create enough copies of the fact sheet for at least one per pair. In pairs or individually read the fact sheet. Break into small groups. Hand out one copy of the 'Fill in the gap' cards per group. Match the right sentence card with the correct gap card (save on printing - laminate so you can re-use them another time).
3. Conduct a 'What if' brainstorm activity. Use the following questions to guide this activity and record answers on a whiteboard.

Activity Title:

Oil spills and the beach community

Environmental Education Aspect:

About the environment

Environmental Education Concept:

- Interdependence

Curriculum Links:

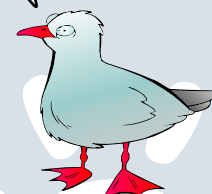
- Social Science
- Science

Suggested Curriculum Level:

Any secondary

SUSTAINABILITY TIP!

Reduce your dependence on oil! Encourage your family to not use your car for one day, three days or even a week!



'What if' questions:

- What if the *MV Rena* was an oil tanker?
 - What if there was fifty times more oil spilled?
 - What if the oil spilled was a light grade oil? How would the impact have differed?
 - What if the *MV Rena* spilled its oil in Tauranga Harbour? How would the impact of the spill differ from what actually happened?
 - What if we didn't clean it up? How would the oil continue to impact on the environment and our beach use?
4. Hold a discussion about the impacts of an event like the grounding of the *MV Rena* on people.
- How did you feel about the grounding of the *MV Rena*?
 - How did you feel about all the oil and rubbish on the beach?
 - How else did the event affect you? Could you still go to the beach? Did you stop swimming at the beach for a while?
 - How did the *MV Rena* grounding affect your parent's work or someone else you know?
 - (If you are not from the region then conduct an imaginary exercise of what impacts you might experience.)
5. Complete the following: Imagine you are a pīngao plant, a dotterel or a sand dune from an oil spill affected beach. Write a story, poem or song that tells the story of how the *MV Rena* oil spill affected you, your home and community.

Possible next steps

- 6m Developing a plan of action to protect the local beach – an activity that encourages action to take care of local beaches

Booming operations underway with MV Rena and support vessels in the background - 24 October 2011, Image credit Maritime New Zealand

Case study: Oil spills, the MV Rena and the beach community

What is an oil spill?

An oil spill is an accidental release of petroleum oil into the environment.

Petroleum oil is formed over millions of years deep under the ground. While it is a naturally occurring substance it can be highly toxic. Oil is petroleum in any form including crude oil, fuel oil or refined products such as diesel.

We normally think of oil spilling into water but oil spills can happen on land as well. When we think of marine oil spills we often think of spills from large oil tankers (large ships that carry oil across the sea). New Zealand is not a big producer of oil and the country's only oil refinery is in Northland. Ships carry oil to and from the refinery. Oil is taken to the refinery in crude form from overseas and around New Zealand. This oil is refined at the refinery and then transported again by ship to other ports around New Zealand. There has been a lot of attention on preventing oil spills from shipping going to and from the Marsden refinery. But...all ships carry oil. The MV Rena oil spill taught us that oil spills from other (non oil tanker) shipping also can have a devastating effect on our environment.



Image credit: Maritime New Zealand

What happened when the MV Rena ran aground?

The cargo ship *MV Rena* ran aground on Astrolabe Reef (Ōtāiti), near Tauranga, on 5 October 2011. An oil leak was detected that night. In the two weeks that followed, 88 containers and approximately 350 tonnes of oil escaped from *MV Rena*, some of it washed up at various points along the Bay of Plenty coastline¹.

It was not only *MV Rena*'s oil; but also wreckage from containers that affected the Bay of Plenty marine environment. Damaged containers spilled their contents (including timber, milk powder, meat and plastics) into the sea and onto beaches.

In the weeks and months that followed, more oil and containers were lost overboard as salvors worked to remove oil and containers from the wreck. Many containers and more than 1,300 tonnes of heavy fuel oil were recovered from the *MV Rena*. More than six months after the *MV Rena* ran aground, small amounts of oil, containers and other debris continued to spill into the sea.

¹ Maritime New Zealand. (2012). Retrieved 13 April 2012 from <http://www.maritimenz.govt.nz/Rena/QandA.asp#summary>

Is all oil the same?

There are many different types of oil. Oils can be light and fluid, heavy sticky and even solid. Heavy sticky oils do not spread as quickly or penetrate sand as easily as lighter oils. Heavy oils are especially bad for wildlife as they do not disperse or dilute as easily. Lighter oils have vapours that are toxic and can be flammable.

The oil on board *MV Rena* was HFO (heavy fuel oil) 380. It's not like car oil, or diesel but has a consistency more like Marmite. It is a very heavy, sticky oil.



Images of Pāpāmoa Beach during the MV Rena oil spill Photos © Indigo Pacific Ltd

What impacts do marine oil spills have on animals that live in the beach environment?

Oil spills affect all marine species including fish, shellfish, birds, marine mammals. Coastal birds that live and feed in the dune and beach environment are affected by marine oil spills.

Oil can damage a bird's feathers. When a bird's feathers are oiled they lose their insulation and are exposed to temperatures that they normally wouldn't experience. Birds with oiled feathers also find it hard to float, swim and fly. Birds will naturally try and clean the oil from their feathers. When they do this they are likely to swallow oil and damage their internal organs.

How did the MV Rena wreckage impact on the animals that inhabit the beach?

More than 1,000 dead birds were recovered in the first two weeks after the Rena grounding². Little blue penguins were the most common bird to be found oiled and alive. Nationally rare species that live on the beach environment such as New Zealand dotterel were also at risk.

² Te Papa. (2012). Retrieved 13 April 2012 from <http://blog.tepapa.govt.nz/2011/10/28/rena-oil-spill-update-on-bird-mortality/>

There were also concerns about the impact of debris on wildlife, particularly the translucent plastic beads that spilled from the *MV Rena's* cargo.

Shorebirds such as the threatened New Zealand dotterels feed on sand hoppers and fish eggs, which are also translucent and a similar size to the beads³.

What about the plants? – How do oil spills affect dune and beach vegetation?

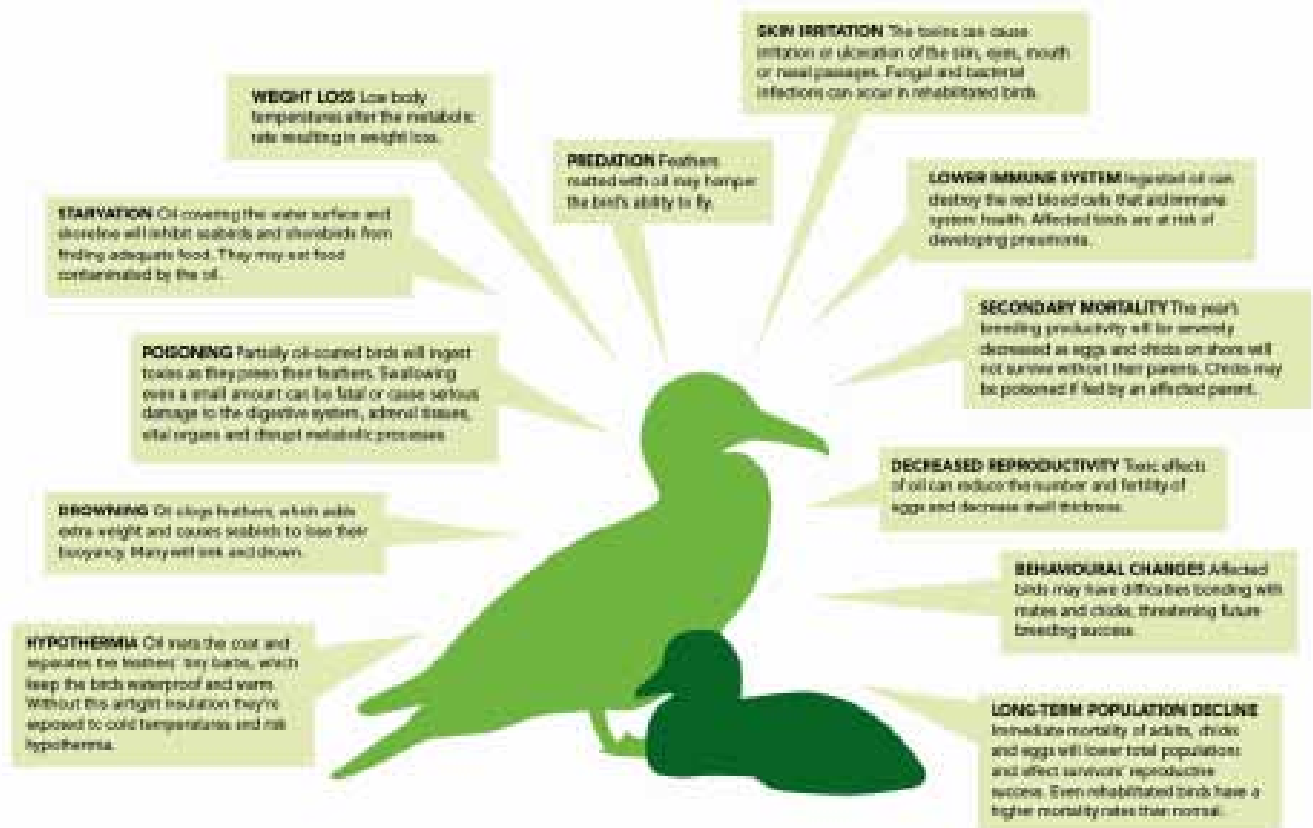
Coastal plants are vulnerable to buried and surface oil as well as oil residue. Oil in the soil can be directly toxic to plants. Oil can affect plants by blocking air exchange through the surface of a plant. Long term effects of oil on plants can include the production of less viable seeds and reduced germination⁴.

Another impact of oil spills on dune plants is damage from machinery and clean up crews walking on dunes. Rather than removing plants for cleaning, plants are often left to recover naturally.

³ Forest and Bird. (2012). Retrieved 13 April from <http://www.forestand-bird.org.nz/what-we-do/publications/media-release/rena-clean-focus-on-wildlife-needed>

⁴ Operational Science Advisory Team ASAT-2. (2011). Retrieved 13 April 2012 from [http://www.restorethegulf.gov/sites/default/files/documents/pdf/Annex%20L%20Misc%20Receptors%20\(3\).pdf](http://www.restorethegulf.gov/sites/default/files/documents/pdf/Annex%20L%20Misc%20Receptors%20(3).pdf)

THE PHYSICAL TOLL



Source: Forest and Bird. (2012). Retrieved 15 April 2012 from <http://www.forestandbird.org.nz/node/13019>

What impact do oil spills have on the shore and beach?

The impact of oil on a shoreline generally depends on three things:

- The type of oil spilled and the amount that is spilled on shore or that washes up on the shore
- The sensitivity of the shoreline environment where the spill occurs
- The length of time the oil remains

When oil washes onto a beach it needs to be removed. Open coastal beaches are considered easier to clean than some exposed rocky shorelines. Part of the reason for this is that oil spills in some rocky environments are almost impossible to clean up. Imagine for example a heavy oil such as that from the *MV Rena* spilled along cliffs and rocky shores that are difficult or even inaccessible such as the cliff edges on Mōtītī Island. In comparison, sandy beaches can be cleaned manually and mechanically.

In the case of the *MV Rena*, many volunteers helped clean the beaches manually (by hand).

A range of techniques were used to clean the rocky shore including hot and cold flushing, scrubbing, absorbent materials and natural weathering.

There is ongoing environmental monitoring following the *MV Rena* grounding, to assess these techniques and monitor a range of species, especially shellfish. They are good indicators of toxins in the environment as they feed by filtering seawater.



Oiled shag being cleaned at the wildlife rehabilitation facility set up at Tauranga.



A penguin awaits cleaning at the Oiled Wildlife Response facility.



A little blue penguin gets the star wash treatment at the Oiled Wildlife Response Centre



Little blue penguins, recovering from their encounter with fuel oil

Top: MV Rena losing containers as heavy swells wash her deck, debris from containers that have toppled off the stricken Rena.

Middle: Oil on beach - NZ Defence Force personnel continuing with cleanup operations on the northern side of Mount Maunganui.

Bottom: Booms at Maketū, a container from the Rena with its contents spilled across the beach.

Image credits: Maritime New Zealand

Find out more

If you want more information on Coast Care groups and programmes contact:

Coast Care Coordinator, Bay of Plenty Regional Council

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Email: coastcare@boprc.govt.nz

Website: www.boprc.govt.nz

Address: 5 Quay Street, PO Box 364, Whakatāne 3158



Bay of Plenty Regional Council in partnership with Tauranga City Council; Whakatāne, Western Bay of Plenty, and Ōpōtiki District Councils; and the Department of Conservation.

Activity:

Fill in the gap cards (student version)

Sentence cards

Gap cards

_____ oil is formed over millions of years deep under the ground.	PETROLEUM
The _____ ship <i>MV Rena</i> ran aground on Astrolabe Reef near Tauranga, on 5 October 2011.	CONTAINER
Heavy sticky oils do not spread as quickly or penetrate sand as easily as lighter oils but they are especially bad for wildlife as they do not _____ or dilute easily.	DISPERSE
_____ oils have vapours that are toxic and can be flammable.	LIGHTER
The oil on board <i>MV Rena</i> was HFO (heavy fuel oil) 380. It's not like car oil, or diesel but has a consistency more like Marmite. It is a _____ sticky oil.	HEAVIER
Coastal _____ that live and feed in the dune and beach environment are affected by marine oil spills.	BIRDS
More than one thousand dead birds were recovered in the first two weeks after the <i>MV Rena</i> grounding. _____ were the most common bird to be found oiled and alive.	LITTLE BLUE PENGUINS
Species that live on the beach but are not common to the beach environment such as _____ were put at risk by the <i>MV Rena</i> oil spill.	NEW ZEALAND DOTTEREL
_____ are vulnerable to being buried and to surface oil and oil residue.	COASTAL PLANTS

The impact of oil on a shoreline generally depends on three things. One of these is the type of oil spilled and the _____ spilled on shore.	AMOUNT
The impact of oil on a shoreline generally depends on three things. One of these is the _____ of the shoreline environment where the spill occurs.	SENSITIVITY
The impact of oil on a shoreline generally depends on three things. One of these is the length of time the _____ remains.	OIL
When oil washes onto a beach it needs to be _____.	REMOVED
Open coastal _____ are considered easier to clean than some exposed rocky shorelines.	BEACHES
Oil spill affected beaches can be _____ manually and mechanically.	CLEANED
A range of techniques was used to clean the _____ shore following the <i>MV Rena</i> spill.	ROCKY
Flushing rocks with hot and _____ water was one of the techniques trialled.	COLD
Shellfish are a good indicator of water quality because they _____ seawater to feed.	FILTER

Activity:

Fill in the gap cards (teacher answers)

Sentence cards

PETROLEUM oil is formed over millions of years deep under the ground.

The **CONTAINER** ship *MV Rena* ran aground on Astrolabe Reef near Tauranga on 5 October 2011.

Heavy sticky oils do not spread as quickly or penetrate sand as easily as lighter oils but they are especially bad for wildlife as they do not **DISPERSE** or dilute easily.

LIGHTER oils have vapours that are toxic and can be flammable.

The oil on board *MV Rena* was HFO (heavy fuel oil) 380. It's not like car oil, or diesel but has a consistency more like Marmite. It is a **HEAVIER** sticky oil.

Coastal **BIRDS** that live and feed in the dune and beach environment are affected by marine oil spills.

More than one thousand dead birds were recovered in the first two weeks after the *Rena* grounding. **LITTLE BLUE PENGUINS** were the most common bird to be found oiled and alive.

Species that live on the beach but are not common to the beach environment such as **NEW ZEALAND DOTTEREL** were also casualties of the *MV Rena* oil spill.

COASTAL PLANTS are vulnerable to being buried and to surface oil and oil residue.

The impact of oil on a shoreline generally depends on three things. One of these is the type of oil spilled and the **AMOUNT** spilled on shore.

The impact of oil on a shoreline generally depends on three things. One of these is the **SENSITIVITY** of the shoreline environment where the spill occurs.

The impact of oil on a shoreline generally depends on three things. One of these is the length of time the **OIL** remains.

When oil washes onto a beach it needs to be **REMOVED**.

Open coastal **BEACHES** are considered easier to clean than some exposed rocky shorelines.

Oil spill affected beaches can be **CLEANED** manually and mechanically.

A range of techniques was used to clean the **ROCKY** shore following the MV Rena spill.

Flushing rocks with hot and **COLD** water was one of the techniques trialled.

Shellfish are a good indicator of water quality because they **FILTER** seawater to feed.