



Spotlight on Survival: Animal communities in an arid environment

BIOLOGICAL SCIENCES



QGC

FUTUREMAKERS



**QUEENSLAND
MUSEUM NETWORK**



**Queensland
Government**

Introduction

Queensland has more animal species than anywhere else in Australia and is recognised as one of the most biologically diverse places on Earth. Queensland Museum scientists document these populations and any changes that affect them through time. This in turn informs conservation programs, land management and biosecurity.

Spotlight on Survival focuses on arid and semi-arid environments which cover approximately 70% of Australia's land mass (Source: [Geoscience Australia](#)).

These environments are often subjected to changes in temperature and the availability of water (as well as changes resulting from human activity). Animals need adaptations to survive these changing or challenging conditions.

Key questions prompted by this resource

- What animals (and plants) live/grow in arid environments?
- How have they adapted to survive?
- What changes do they encounter?
- What relationships support or challenge their ability to survive?

Future Makers is an innovative partnership between Queensland Museum Network and Shell's QGC business aiming to increase awareness and understanding of the value of science, technology, engineering and maths (STEM) education and skills in Queensland.

This partnership aims to engage and inspire people with the wonder of science, and increase the participation and performance of students in STEM-related subjects and careers — creating a highly capable workforce for the future.

© Queensland Museum. The images included in this teaching resource may be used for non-commercial, educational and private study purposes. They may not be reproduced for any other purpose, in any other form, without the permission of the Queensland Museum.

Activity Overview

This STEM resource can be used to support teacher connections with Queensland Museum and offer activities to open or extend student investigations. Themes include animal adaptations, arid environments and patterns, cycles and relationships found within ecosystems. It explores changing and challenging conditions and how they may impact growth and survival.

Activities will:

- encourage students to recognise animal populations in arid environments
- support students' comparisons of needs and physical/behavioural adaptations
- form concepts about cause-and-effect relationships
- offer students ways to record and interpret data and make predictions

Investigation 1: Survival game

Boom and Bust Bingo

Whole class or large group activity

Page 5

A teacher-led interactive story. Students respond to an account of daily and seasonal change occurring within an arid environment. As natural cycles and changes occur, some animals may “disappear” from the landscape.

Extension:

What would happen if?

Whole group activity with students working in small groups

Page 13

A critical thinking challenge, opening inquiry into effects of change brought about by human activity within an arid ecosystem.

Investigation 2: Wildlife Survey

Charting Change

Individual activity

Page 15

Reflecting on knowledge and concepts developed from Boom and Bust Bingo, students use a 4-quadrant Cartesian plane and map to conduct a hypothetical field study.

Symbolic elements such as a legend, scale, compass and x/y-axes are used to collect and project information. Data (observations, patterns and relationships) is both interpreted and expressed using simple codes, coordinates and reasoning.

Explore more:

Queensland Museum Learning Resources

Experiences, content and links which complement this resource

Page 21

Plan an excursion, explore exhibitions, browse online resources or borrow collections for your classroom or library.

Curriculum Links

Science

YEAR 6

Biological sciences

The growth and survival of living things are affected by physical conditions of their environment ([ACSSU094](#))

Science as a Human Endeavour

Nature and development of science

Science involves testing predictions by gathering data and using evidence to develop explanations of events and phenomena and reflects historical and cultural contributions ([ACSHE098](#))

Science Inquiry Skills

Questioning and predicting

With guidance, pose clarifying questions and make predictions about scientific investigations ([AC SIS232](#))

Processing and analysing data and information

Construct and use a range of representations, including tables and graphs, to represent and describe observations, patterns or relationships in data using digital technologies as appropriate ([AC SIS107](#))

Communicating

Communicate ideas, explanations and processes using scientific representations in a variety of ways, including multi-modal texts ([AC SIS110](#))

Compare data with predictions and use as evidence in developing explanations ([AC SIS221](#))

Mathematics

YEAR 6

Measurement and Geometry

Location and transformation

Introduce the Cartesian coordinate system using all four quadrants ([ACMMG143](#))

Statistics and Probability

Data representation and interpretation

Interpret and compare a range of data displays, including side-by-side column graphs for two categorical variables ([ACMSP147](#))

Investigation 1: Survival game

After Antarctica, Australia is the driest continent in the world. About 35% of the continent is classified as desert (source: [Geoscience Australia](#)). Native plants and animals have adapted to life on an isolated continent over millions of years.

The following activity is a journey through days and seasons of an arid environment. This game can be used to introduce or extend student's own investigations.

TEACHER TIP: This story is accompanied by a slideshow, but this can be optional. The activity may be applied to the orientating phase of learning (or) to the synthesising phase, with students producing an accompanying slideshow, themselves.

Activity: Boom and Bust Bingo

Activity format:

A multi-sensory, interactive group learning experience.
Played as large group or whole class.

Needs:

Transcript of narration (*page 6 – 12*)
Printed multiples of Boom and Bust Bingo grid (*print page 5*)
Pen or pencil to mark bingo grid
Shared or individual screen access with audio capacity
PowerPoint compatible software
[Boom and Bust Bingo PowerPoint slideshow](#)

Method:

Played like bingo (using animals instead of numbers), this is a game of elimination. Find out which animal populations are impacted, and which populations remain following a series of changes.

As animals are adapted to survive within their habitat, it is important to explain to students that during this game, elimination does not mean extinction, or even death. Many species “disappear” at various stages in their lifecycle (they may be affected by habitat disturbance and predation or perhaps behaviours such as migration, burrowing or a dormant stage of their lifecycle).

Students contribute as the story progresses, with a series of prompting questions.

TEACHER TIP: Possible student responses/discussion points are listed in italics.

If an individual's selected animals are all crossed off their grid, they verbalise their elimination with “BUST”, but can continue to input as the story builds with scaffolded all-group discussion.

Animals showcased in **Boom and Bust Bingo** are listed below. Images have been provided (see slideshow) so that players can recognise all animals featured.

- Cicada (nymph and adult)
- Budgerigar
- Major Mitchell's Cockatoo
- Echidna
- Wedge-tailed Eagle
- Perentie (goanna)
- Red Kangaroo
- Camel
- Thorny Devil (lizard)
- Dingo
- Shield Shrimp
- Crucifix Frog
- Pelican
- Termites
- Greater Bilby
- Woma (python)
- Desert Scorpion

Step 1) Commence slideshow, pausing on slides 2 – 3, allowing students to identify each of the animals listed.

Encourage information sharing among the group.

Step 2) Distribute Boom and Bust Bingo grid to all players.

Step 3) Each student chooses six (6) animals from the list.

Step 4) Before the game begins, students are asked to list what they think helps each of those six animals survive. (All animals are adapted to survive, but some may be affected by change and activity that take place in this story).

Step 5) Students listen carefully to the story narrated by the teacher, with accompanying audio-visual slideshow (teacher narration commences on slide 5).

As the story progresses, they monitor the movement of each animal population, sharing ideas and information. When instructed, students need to cross off animals from their selection.

Step 6) When their last animal is crossed off, students can shout “bust”. They continue listening to the story to find out which animal populations remain.

Step 7) At the end of the story, some students may still have 1 – 4 animals on their grids. Discuss why they think these animals were able to remain in the environment, despite extreme and changing conditions. Information to scaffold class discussion is listed in brown.

BOOM and BUST BINGO playing grid

HABITAT	ANIMALS
TREES also known as 'woodlands'	Cicada adults, Wild Budgerigar, Major Mitchell's Cockatoo
GROUND LEVEL includes underground	Cicada nymphs, Crucifix Frog, Termites
WILD CARD WANDERERS These predators can travel long distances	Wedge-tailed Eagle, Perentie, Dingo
GRASSLAND also known as 'savanna'	Red Kangaroos, Echidna, Greater Bilby
ROCK OUTCROP	Thorny Devil, Woma (python), Scorpion
BILLABONG	Shield Shrimp, Pelican, Feral Camel

INSTRUCTIONS

<p>STEP 1: BINGO GRID</p> <p>Your teacher will introduce you to 18 animals found in arid environments.</p> <p>Choose six (6) animals from any habitat (you cannot choose the same animal more than once).</p>	<p>STEP 2: BEFORE THE GAME</p> <p>Before the game begins, list any adaptations that you think may help your animals survive. (All animals are adapted to survive, but some may be affected by change and activity that takes place in this story). Consider your animal's habitat and physical characteristics.</p>
<i>List 6 animals found in <u>your</u> arid ecosystem</i>	<i>List 1–2 adaptations that you think help those animals survive in arid conditions</i>
1.	1. _____
2.	2. _____
3.	3. _____
4.	4. _____
5.	5. _____
6.	6. _____

STEP 3: LISTEN TO THE STORY, respond to any questions.

Cross off any of your animals if instructed. If all your animals get crossed off, **yell “BUST”** and listen to the remainder of the story.

BOOM and BUST BINGO narration

TEACHER TIPS: Preview slideshow and adjust volume of audio files for your space and class size.

Allow time for slideshow to partially advance before narration commences.

Slides 1-4 offer preliminary material to introduce animals and worksheet to students. This will allow students to observe animal characteristics and select from familiar and unfamiliar fauna.

Play slides 1-3 before distributing copies of the BOOM and BUST Bingo playing grid.

Slide 4 depicts game instructions.

(Slide 1)	Holding Slide – Introducing <i>Boom and Bust Bingo</i> activity
(Slide 2)	Introducing animals (1 – 9 of 18)
(Slide 3)	Introducing animals (9 – 18 of 18)
(Slide 4)	Bingo Grid instructions
(Slide 5 – 6)	<p>It's dusk in the Simpson desert (SLIDE 5). The sun is going down and birds have settled in the trees around the billabong (SLIDE 6). As night falls, some animals begin to call. (CLICK TO ACTIVATE SOUNDTRACK)</p> <p>Q: What animals can you hear?</p> <p><i>Discuss: Birds can be heard. Insects can be heard. Insects include male Cicadas 'calling' for a mate.</i></p>
(Slide 7)	<p>A cicada chorus can reach 100 decibels – like a lawnmower at full throttle. (CLICK TO ACTIVATE/DEACTIVATE SOUNDTRACK)</p> <p>Some scientists believe the intense volume of cicadas could drive predators away... but cicadas are full of protein so are a good meal for hungry predators.</p> <p>If you have listed cicada adults on your grid, cross it off.</p>
(Slide 8 – 9)	<p>What else is becoming active in the cool of the night?</p> <p>Bilbies have come out of their burrows to forage (SLIDE 8). They get moisture from their food so can feed further away from the billabong and dig among the spinifex and rocks... to find tasty scorpions. (SLIDE 9).</p> <p>If you have a scorpion on your grid, cross it off.</p>
(Slide 10 – 12)	<p>A Dingo is sniffing around the rocks and grass tussocks (SLIDE 10). The Bilby's large ears detect danger, so it darts down one of its complex tunnels for safety (SLIDE 11). A Woma has sensed this activity (SLIDE 12). Unlike other pythons, the Woma does not have heat-sensing pits along its jaw.... However, it can detect the scent of the two mammals. A Woma can fit into small spaces, so it has no problem entering a Bilby burrow.</p> <p>If you have the Greater Bilby on your grid, cross it off.</p>

<p>(Slide 13 – 15)</p>	<p>An Echidna is snuffling around and digging at the base of grass tussocks (SLIDE 13).</p> <p>They may find food source among these grasslands. Some species of Termite are grass feeders and often build their mound over a clump of spinifex (SLIDE 14).</p> <p>If you have termites on your grid, cross them off....(cont)</p> <p>...an Echidna’s feeding mechanisms are too effective.</p> <p>Q: What are they – can you describe 3?</p> <p><i>Discuss: Echidna feeding mechanisms include</i></p> <ul style="list-style-type: none"> • claws for digging • sticky tongue (SLIDE 15) • stiffened tongue (allowing it to penetrate insect chambers in soil and timber) • sensitive snout (can be used as a crowbar but also has electrical receptors to detect underground activity) • good sense of smell • ability to recognise space (which is helpful, since ants & termites typically rebuild their nests after damage)
<p>(Slide 16 – 17)</p>	<p>The hungry Dingo knows an Echidna is not a fast animal... could it be an easy meal? (SLIDE 16 – WITH SOUND EFFECTS).</p> <p>But the Echidna tucks its head down and begins to burrow. It now resembles a tussock of burnt grass (SLIDE 17), but the Dingos will find it with its keen sense of smell.</p> <p>Q: An Echidna’s skin covering provides more than camouflage. How else does the Echidna use its quills?</p> <p><i>Discuss: Echidna quills are an effective defence mechanism (quills are sharp and rigid enough to pierce skin)</i></p> <p>The Echidna’s curled posture makes its quills protrude, effectively spiking the sniffing Dingo’s sensitive nose. The dingo hunt is unsuccessful. It will have to hunt or scavenge a meal elsewhere.</p> <p>If you have a Dingo on your grid, cross it off.</p>
<p>(Slide 18 – 19)</p>	<p>The sun is coming up and Kangaroos begin grazing. (SLIDE 18)</p> <p>Also seeking grass, but not for eating, is the Thorny Devil. (SLIDE 19)</p> <p>It gets moisture from the morning dew.</p> <p>Q: Who can explain how it does this?</p> <p><i>Discuss: This lizard has spiky skin. Grooves between the spikes create channels that draw water into its mouth when it comes into contact with moisture (e.g. by brush against strands of dewy grass).</i></p> <p>This is called capillary action. Each skin groove behaves like bundles of tiny drinking straws. But now the sun is up, the Thorny Devil also needs to feed. They hunt during the day.</p> <p>Q: It’s a specialised feeder and its small mouth is designed to eat what?</p> <p><i>Discuss: Ants (lots of them – up to 5000 in a single meal)!</i></p> <p>However, throughout the night the Echidna demolished several ant nests in this lizard’s home range.</p> <p>If you have a Thorny Devil on your grid, cross it off.</p>

<p>(Slide 20 – 23)</p>	<p>Another reptile, the Perentie (SLIDE 20), often finds food by digging. However, being an opportunistic feeder, it will also hunt above ground, when those same digging claws can be effective anchors for climbing (SLIDE 21)</p> <p>At this time of year, the Perentie may might find a meal in the hollow of a tree. Their long necks and narrow heads allow them to hunt animal burrows below ground and nesting hollows up high (SLIDE 22).</p> <p>Q: What do you think a goanna would find to eat in a tree?</p> <p><i>Discuss: Goanna prey found in a tree could be</i></p> <ul style="list-style-type: none"> • Bird eggs or chicks • lizards • insects • small mammals <p>Every species of cockatoo in Australia relies on hollows in trees to lay eggs and raise their chicks. (SLIDE 23)</p> <p>If you have a Major Mitchell’s Cockatoo on your grid, cross it off.</p> <p>Q: Who was Major Mitchell?</p> <p><i>Discuss: Major Sir Thomas Mitchell was an early surveyor. He undertook several inland expeditions exploring what is now known as Victoria, New South Wales and Queensland. The town of Mitchell in South West Queensland and the Mitchell River in Far North Queensland have also been named after him.</i></p>
<p>(Slide 24 – 27)</p>	<p>The Kangaroos are grazing – this term means feeding on grass (SLIDE 24).</p> <p>Q: Name 3 ways a Kangaroo can survive drought conditions.</p> <p><i>Discuss: Kangaroos survive drought conditions a number of ways</i></p> <ul style="list-style-type: none"> • mobs move towards shade in middle of day. • Kangaroos lick their forearms and chest for evaporation. • a doe can regulate her joey’s development, so that they give birth when resources are available. • Kangaroos can pant to dissipate excess heat. • Kangaroo intestines can re-absorb remaining moisture before being lost in droppings. • Red Kangaroos will browse for bushes when grass is scarce.
<p>(Slide 25 – 27)</p>	<p>Months pass and the desert gets hotter and drier. (SLIDE 25).</p> <p>Temporary lakes from the last wet season become cracked clay pans. (SLIDE 26)</p> <p>Water courses like rivers are reduced to billabongs, with others leaving patchy pools of stagnant water.</p> <p>The large wings of a Pelican are excellent for soaring (SLIDE 27). This allows them to fly long distances. Our flock of pelicans take flight to an area with more water.</p> <p>If the Pelican is on your grid, cross it off... these conditions are not right for you.</p>

<p>(Slide 28)</p>	<p>The sun is evaporating the water so there is not much left in smaller, shallow pools. A roaming herd of Camels fouled some pools with manure. During the heat of summer they will drink every day while water is available.</p> <p>The Camel is a feral animal in Australia but they are well adapted to tolerate arid conditions (SLIDE 28).</p> <p>Q: What are 3 physical adaptations that help Camels survive?</p> <p><i>Discuss: A Camel's survival adaptations include</i></p> <ul style="list-style-type: none"> • generalist feeder – does not need to feed from specific plants • long lashes to protect eyes from sand carried on wind (a third, clear “eyelid” also protects the eye) • nostrils that can be closed to protect them during sandstorms • wide toes for travel over sand • hump storing fat deposits (to provide sustained energy when food is limited) • ability to drink infrequently • ability to drink rapidly (35 litres of water in less than 15 minutes!)
<p>(Slide 29)</p>	<p>Shield Shrimps (SLIDE 29) have been on the planet for millions of years. They breed quickly and can breathe in the murky water left by the Camels, but no adaptation can save them from a Camel's thirsty slurp.</p> <p>If you have the Shield Shrimp on your grid, cross it off.</p> <p>The good news is – in a short lifecycle, many eggs were laid which during the dry seasons, remain dormant. Dormant eggs will be spread on the Camel's feet, allowing populations to spread before the next wet season.</p>
<p>(Slide 30 – 31)</p>	<p>After drinking, the Camels are browsing – this term means feeding on trees. A cluster of trees looks particularly green, but then the leaves are suddenly gone! (SLIDE 30)</p> <p>They were a flock of budgerigars (SLIDE 31).</p> <p>If you have the Camel on your grid, cross it off.</p>
<p>(Slide 32)</p>	<p>Wedge-tailed Eagles soar on the thermals as the day heats up (SLIDE 32). Thermals are currents of warm air. Unlike most other animals they can continue breeding during drought, if food is available. Just like the Dingo, their food includes carrion.</p> <p>Q: What is carrion?</p> <p><i>Discuss: Carrion refers to dead animals/animal remains.</i></p>
<p>(Slide 33 – 35)</p>	<p>A weak, young kangaroo becomes stuck in mud trying to get water from a dried river bed (SLIDE 33). Exhausted, it perishes but the parent eagles will be able to feed their two chicks (SLIDE 34 – 35).</p> <p>If you have the Red Kangaroo on your grid, cross it off.</p>

<p>(Slide 36 – 39)</p>	<p>Beneath the earth, the Crucifix Frog is protected from heat and drying out in a cocoon made of shed skin (SLIDE 36).</p> <p>It can remain underground for years. This frog will not emerge until rain soaks the ground, which triggers rapid breeding so tadpoles can hatch and mature while water is in supply.</p> <p>When it surfaces, its skin provides another form of protection. Glands that secrete a glue-like substance and its vivid colouring is used toward off predators (SLIDE 37).</p> <p>Further north, rain clouds are gathering. These changes in the environmental conditions may affect animal survival in a number of ways... (SLIDE 38)</p> <p>Termites are ancient survivors. Colonies quickly rebuild following attack by predators (SLIDE 39).</p> <p>As they sense the changing climate, winged termites leave the rebuilt colony to fly to a new location.</p> <p>Termites are social insects that live in a co-operative community. Individual termites usually have different roles, which are recognised by shape or specialised body parts.</p> <p>Termites that develop wings are “alates”. As the only winged termites in the colony, their role is to fly to a new location and reproduce.</p> <p>Q: Can you predict which termite has the following adaptations: A large abdomen for egg production?</p> <p><i>Discuss: The queen. Some species lay 10-1000 eggs in a day! Some colonies have more than one queen. Despite her demanding job, some queen live up to 20 years.</i></p> <p>Small size, blind but strong and co-operative?</p> <p><i>Discuss: The worker. Workers are sterile (unable to breed). They gather food, maintain the “nest” and care for the young.</i></p> <p>A big head and jaws for biting and head-butting?</p> <p><i>Discuss: The soldier. These are adapted to be the colony defenders. Some species also have two size ‘classes’ (major and minor soldiers).</i></p>
<p>(Slide 40 – 41)</p>	<p>On the horizon, the first flashes of lightning can be seen.</p> <p>A lightning strike hits a dead tree, setting it on fire (SLIDE 40).</p> <p>The tree was a nesting roost for Wedge-tailed Eagle family (SLIDE 41).</p> <p>If you have the Wedge-tailed Eagle on your grid, cross it off.</p>
<p>(Slide 42 – 43)</p>	<p>The falling tree starts a grass fire, which due to sparse vegetation in the dry season, burnt itself out. The grass was a source of seeds eaten by the Budgerigar flock. They need to move to a new feeding location (SLIDE 42).</p> <p>If you have the Budgerigar listed on your grid, cross it off. (SLIDE 43)</p>

<p>(Slide 44 – 45)</p>	<p>The rains have been falling elsewhere and gathering in channels for kilometres around (SLIDE 44).</p> <p>Water is collected and is moving across the landscape. Clay pans and dry creek beds fill as the land begins to flood. Some underground animal burrows become inundated by water.</p> <p>Cicada nymphs emerge after rain but this time, many don't get a chance to metamorphose into adults when the river banks break and trees along the riverbank are submerged or damaged (SLIDE 45).</p> <p>If you had cicada nymphs on your grid, cross them off.</p>
<p>(Slide 46 – 47)</p>	<p>Echidnas are excellent swimmers but may not be able to feed in these conditions (SLIDE 46).</p> <p>If you had the Echidna on your grid, cross it off.</p>
<p>Summary</p>	<p>The landscape has undergone some extreme changes as day turned to night and seasons changed from dry to wet.</p> <p>Let's examine what has happened in our ecosystem. Some animals have gone, others have remained, most will return as the cycle begins again.</p> <ul style="list-style-type: none"> • Hands up who has 1 animal survivor left on their grid? • Hands up who has 2 animal survivor left on their grid? • Hands up who has 3 animal survivor left on their grid? <p><i>Congratulations! You had a population of animals whereby several were able to survive the extreme conditions and remained in your environment during times of the change.</i></p> <p>Q: Which animals are left on your bingo grids?</p> <ul style="list-style-type: none"> • Woma, • Perentie, • Crucifix Frog <p>Let's look at our remaining species and what adaptations allowed them to remain active in this habitat.</p> <p>Q: What adaptations (behaviours and physical characteristics) helped them survive and remain in the region?</p> <p><i>Discuss:</i></p> <ul style="list-style-type: none"> • <i>The Woma can swim but may not be able to hunt until the water subsides – fortunately snakes do not need to feed regularly.</i> • <i>The Perentie can swim and climb – as a generalist feeder, it could probably continue to hunt or scavenge, finding opportunities to hunt stranded or drifting prey in flooded areas.</i> • <i>The Crucifix Frog emerges after rain to breed. They are not strong swimmers but breed rapidly. By the time flooding occurs, their tadpoles have emerged, equipped to cope with the rising water and feeding on debris and aquatic insect larvae (brought on by the 'boom' of the wet season).</i> • <i>Males call from ponds of shallow water to attract the female to begin breeding cycle. Tadpoles develop into adult frogs rapidly, so they can take advantage of the seasonal wet conditions and reduce the risk of drying out. Perfect conditions for a BOOM!</i>

Conclusion	<p>Rains can trigger some amazing activity in our arid ecosystem.</p> <p>Water will regenerate the parched landscape and plants will become green, allowing their leaves, stems and seeds to become a food source for many herbivores, this is called a “boom”.</p> <p>Animals who have lifecycles or breeding cycles triggered by the weather may increase in population – which in turn, may offering predators a <i>boom</i> supply of food.</p> <p>Opportunistic feeders like scavengers may assist with the flood “clean up” and other predators may find prey in exposed locations, or in ‘pockets’ where the populations have become dense.</p>
-------------------	--



So what IS a billabong?

A billabong is body water which is an isolated pool. Billabongs typically form within a drying river, a river changing direction or by water flowing from the main stream during a flood.

Extension activity: What would happen if?

Activity format:

A fast-paced, critical thinking challenge to examine potential cause/effect relationships of human activity on an ecosystem.

Students work in small groups.

Needs:

Time keeping device (set to 30 seconds)

Five separate tables

Five different scenarios describing human activity (suggestions listed below) printed on separate pages

1. A multiple-lane road
2. An underground mine
3. Crop irrigation (diverting water from rivers, creeks and underground supplies)
4. Introduced Cane Toad populations
5. Tree clearing (to encourage grass to grow for grazing)

Method:

Place printed pages face-down in the middle of each table.

Students are randomly assigned an animal identity from Boom and Bust Bingo and form small groups with other students representing that animal.

Groups are spread across the 5 tables in the room.

TEACHER TIP: To direct students to their first table, you could assign each table a Boom and Bust Bingo habitat. Animal groups from Wild Card wanders can choose to join any table, as their populations are highly mobile.

Step 1) Turn the page over and ensure everyone at that table can read it.

Step 2) In just 30 seconds discuss among your animal group ways you think that human activity may affect your population. It may affect you positively or negatively, or may have little or no effect.

Step 3) When 30 seconds is up, turn the page face down again and move to the next table.

Step 4) Repeat 4 more times, until students have visited each table.

TEACHER TIPS: This open-ended activity can initiate investigations into wider community impacts such as salinity, erosion and introduced flora and fauna.

TEACHER TIPS: For an added dimension, issue counters or post-it notes in 3 colours (representing positive, negative, or minimal/no effect).

Students could then be asked to place a vote (as individuals or as a collective animal population) on each table, indicating how that human activity might affect their population growth and survival.

SPOTLIGHT ON STEM: Queensland Museum collections

Technologies and Society

Did you know...

Some species survive extreme conditions too well!

The drought-resistant American plant, “Prickly Pear” was introduced to Australia soon after European settlement.

By the early 20th Century it had established itself as Australia’s most invasive plant species.

Queensland Museum’s Cultural History collections include a variety of devices invented to eradicate this pest. Designs range from harpoons to incinerators to shovel-sized syringes for injecting poison.

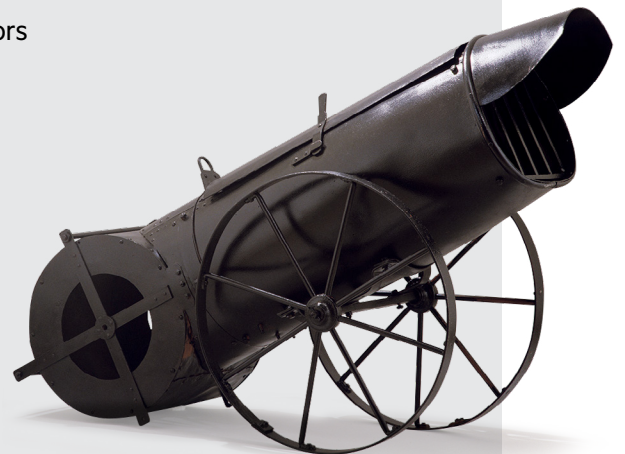
Learn more about

- [Thomas’ Prickly Pear Inoculator](#)
- Prickly Pear singeing machine (right)
- [The Prickly Pear story](#) (Biosecurity Queensland)
- [Prickly Pear - Australia’s prize pest](#)
1933 Cinema newsreel, British Pathe (1:16)



Courtesy H. Rutherford, Australian Invasive Cacti Network

Courtesy H. Rutherford, Australian Invasive Cacti Network



Earth and Space Sciences

Did you know...

Scientists have found fossils of sea creatures in the desert!

Around 110 million years ago, in the middle of what we now call Australia, there was a giant inland sea. This is known as the Eromanga Sea.

Learn more about [outback marine fossils](#) at Queensland Museum.



Investigation 2: Wildlife Survey

This critical thinking activity is an individual learning experience using a map superimposed with a 4-quadrant Cartesian plane. This system is used to identify map locations. Students use mathematical co-ordinates and symbols to document and represent data.

Students interpret data from a hypothetical field survey conducted on the site described in Boom and Bust Bingo. Students reflect on prior learning and can reference the story text and imagery during this activity to inform their predictions and decision-making.

TEACHER TIPS: This activity can be repurposed for a range of environments.

Teachers may opt to use manual or digital formats according to resources available.



Science as a Human Endeavour

Survey findings may be used to monitor populations, discover new species, document threatened species and inform environmental impact statements.

Activity: Charting Change wildlife survey

Activity format:

Individual activity, producing a graphic form of data representation

Needs:

Printed (colour) multiples of Charting Change Cartesian plane/site map.

Printed field survey tasks

Ruler to guide observations

Pen for recording findings

Access to Boom and Bust Bingo narration

Method:

Reflecting on what they know and learned from Boom and Bust Bingo, students document their observations and make predictions about

- a) Characteristics of an arid ecosystem
- b) The habitats and range of various animal populations

Charting Change: Wildlife Survey













A **field survey** is research conducted '*in the wild*' (rather than in the lab). It involves **predictions, observation** and **data collection**.

You are part of a scientific field survey team. Your team has surveyed the arid environments featured in Boom and Bust Bingo.

Use the map to make observations and predictions about relationships among animal populations, habitat, seasonal change and availability of resources.

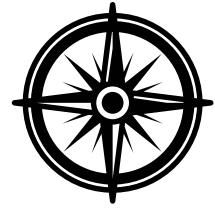
Describe this location using the map legend, compass and co-ordinates of the Cartesian plane to answer the questions below.

MAP LEGEND

	Cliffs (short lines face downhill)		Windmill
	Non-permanent rivers, creeks, bodies of water		Mountain range
	Permanent rivers, creeks, bodies of water		Sand
	Wetlands, marsh		Sand dunes
	Vehicle road		Grasslands, Savannah
	Vehicle track		Woodlands, Scrublands

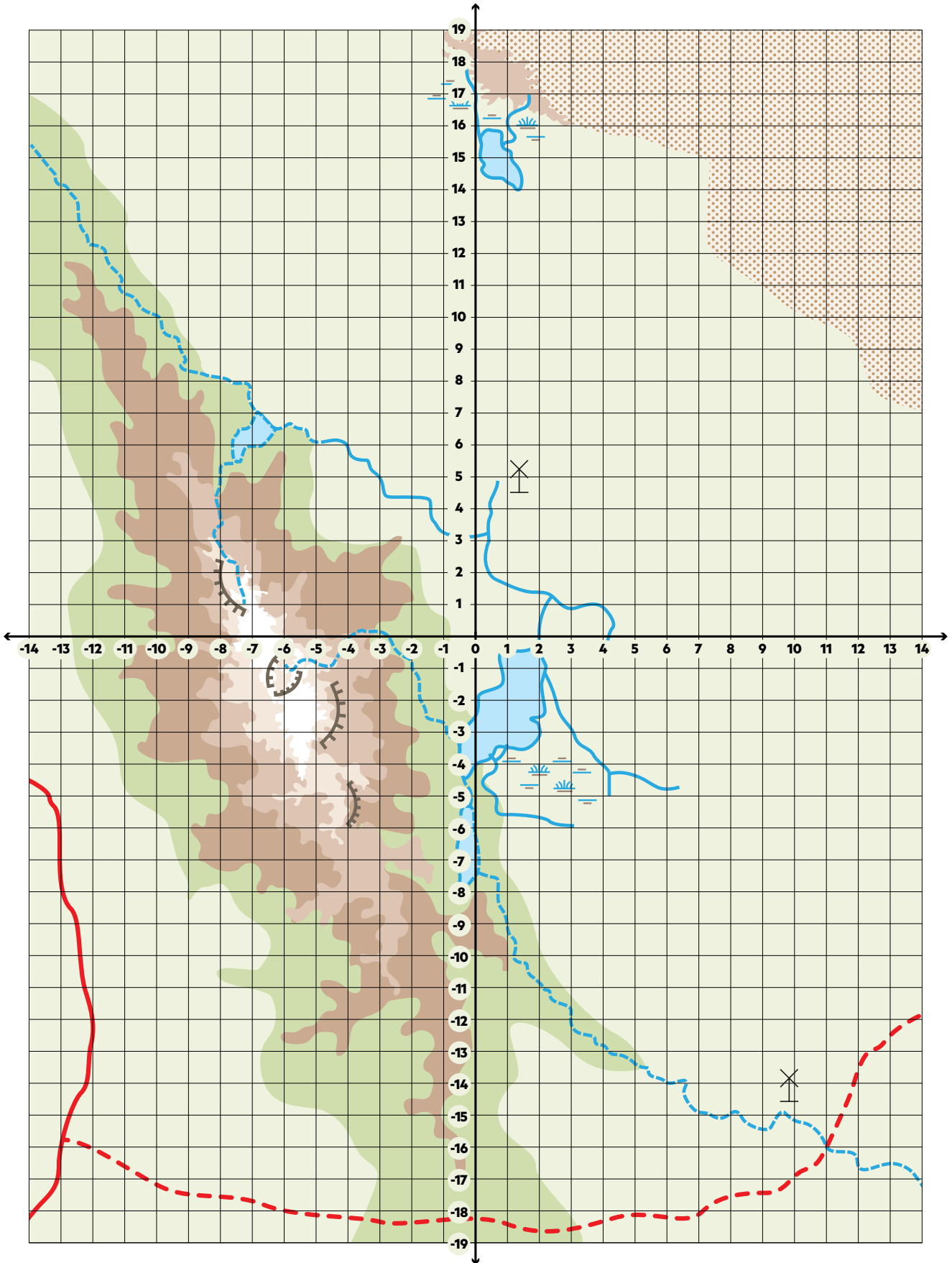
Instructions — Getting Started

1. Label each axis on your compass, N, S, E, W (North, South, East, West)
2. Label each axis on your Cartesian plane. x (horizontal) , y (vertical)
3. Refer to the map legend, compass, scale and elevation to inform your choices. You can also reference text and images from Boom and Bust Bingo.



Lightest tan	400 m
Light tan	300 m
Medium tan	200 m
Darkest tan	100 m

0 0.5 1 1.5 2 2.5
km



FIELD SURVEY: Tasks and Findings

The following animals from Boom and Bust Bingo have been found your area in the past. Your current survey has sighted the circled animals thus far. Twelve questions are being asked for your interim report which documents your sightings and predictions.

HABITAT	ANIMALS
TREES also known as ' <i>woodlands</i> '	Cicada adults, Wild Budgerigar, Major Mitchell's Cockatoo
GROUND LEVEL includes underground	Cicada nymphs, Crucifix Frog , Termites
WILD CARD WANDERERS These predators can travel long distances	Wedge-tailed Eagle Perentie, Dingo
GRASSLAND also known as ' <i>savanna</i> '	Red Kangaroos Echidna, Greater Bilby
ROCK OUTCROP	Thorny Devil , Woma (python), Scorpion
BILLABONG	Shield Shrimp , Pelican , Feral Camel

1. Record the (x, y) co-ordinates for the following:

- a. Windmill (north)
- b. Windmill (south)
- c. Main road intersection

Name two animals likely to be sighted at all three of the co-ordinates above.

Animal 1)

Animal 2)

2. Describe what landform you might find in the area marked by these x, y co-ordinates:

- d. (0, -7)
- e. (11, -16)
- f. (-1, 17)

3. Think about the ecology of your survey area (consider plants, animals, terrain, behaviours, relationships, biological range plus human impacts such as road traffic through habitat).

Predict which large carnivores were sighted at (-12, -11):

a. During the day

Give your reasons

b. During the night

Give your reasons

4. Mark where sand dunes may occur on your map (use the symbols in your legend).

5. Predict an area on your map that may be likely to flood during wet season.

List your reasons

Plot 4 dots to create a shape that defines your projected flood zone. List the co-ordinates of those 4 points.

North:

South:

East:

West:

6. Name an animal (from the list of known species) adapted for moving across large distances.

Describe how they conserve energy for long-distance travel:

7. Most animals need to travel to a water source to drink. Name an animal in your survey area that does not need to do this.

8. List two animal species found in your survey area that depend on an aquatic environment.

a:

Give your reasons:

b:

Give your reasons:

9. Dingos were sighted emerging from caves along the western cliff at dusk.

Approximately how high above sea level are these caves?

What distance would they cover in order to reach the nearest location to scavenge road kill?

What types of terrain and/or vegetation do they travel through?

10. Predict which animals (big or small) could be sighted over many parts of your survey area. List two.

a:

b: Give reasons for their large range.

11. Some animal species that inhabit this region have not been recorded in surveys of your site.

Predict which animal sightings could be influenced by seasonal weather patterns:

a: Wet season:

Give your reasons:

b: Dry season:

Give your reasons:

12. A Conservation Network is proposing an enclosed reserve to re-introduce Greater Bilby populations.

Their criteria for an ideal habitat includes:

- grassland (includes species of grass that grows in sandy areas).
- low ridges and rock formations that support their diet of insects, arachnids, roots and seeds.
- no vehicle roads.

Propose a 10km² site in your survey area which you think may be suitable.

Mark and label this site on your map.

Explore More

The following Queensland Museum resources complement **Spotlight on Survival** and associated learning:

Visit us or bring the Museum to your classroom

Consider using these learning activities in conjunction with a Museum visit. Facilitating student interactions with real specimens in a research environment aligns with Science Inquiry Skills and Science as a Human Endeavour.

- [Visit Queensland Museum & SparkLab, Sciencentre](#)
- [School Bookings page](#)

Includes school visit [planning advice](#) and link to the online [booking form](#) (group bookings essential).

- Explore our exhibition, [Wild State](#).
- Browse [Wild State Teacher Resources](#).

This exhibition showcases five major types of habitat: Arid Outback, Open Forest, Rainforest, Coastal, and Marine. These habitats are ancient, unique and vulnerable, being shaped by changing biotic (living e.g. animals, plants and other organisms) and abiotic factors (non-living e.g. climate, air, soil, water, light) as well as the effects of human activity.

Museum collections may also be borrowed from the [QM Loans](#). This service offers a range of kits and collection material linked with Australian Curriculum Content. A selection of Loans Kits aligned with curriculum content *The growth and survival of living things are affected by the conditions of their environment* ([ACSSU094](#)) are listed below.

Borrow QM Loans kits linked to Yr 6 Biological Sciences

- [Arid Adaptations](#) Investigate behavioural and structural adaptations of Queensland desert plants and animals. (pictured right)
- [Macquarie Island](#) Examine animals, plants and geology found in the extreme sub-Antarctic environment.
- [Antarctica](#) Explore Antarctic animal, plant and geology specimens.
- [Mangroves](#) Investigate how plants and animals that survive in an extreme mangrove habitat.
- [Wetlands](#) Investigate animals that survive in an extreme mangrove and swamp environment.
- [Woodlands to Sea](#) Investigate animals that survive in an extreme coastal environment.

