For Teachers
This field workbook scaffolds three learning experiences at Picnic Bay on Magnetic Island near Townsville. The learning experiences are closely based on lessons drawn from Unit 2, Year 4, C2C Biological Sciences.

The data collected during these learning experiences beyond the classroom will inform the students’ completion of their in-class assessment tasks, i.e.

- Construction of a display that shows the curlew’s habitat
- Preparing a report on the curlew, including information on relationships that help/hinder the curlew’s survival and actions taken by humans to protect the curlew

Purpose
The student describes the relationships between the living and non-living components of ecosystems that assist or hinder survival of living things, in this case the Bush stone-curlew.

The student sequences the stages of the curlew’s life cycle and identifies threats to the curlew’s survival.

Field study tasks

**Part One – A Field Walk Looking at Habitat and Magnetic Island Life Cycles - pages 2-4, 13-14**

Note any evidence of the Bush Stone-Curlew e.g. tracks, scats, signs and access to shelter and breeding sites, food and water. Add to the table on page 13.

Take photographs and describe the features of the Bush stone-curlew and its habitat.

Note evidence of disturbance to the Bush stone-curlew’s habitat e.g. feral plants, clearing, roads

Identify the stages of the Bush stone-curlew’s life cycle and record this as a scientific diagram (pages 2-4)

Create a concept map to illustrate relationships and effect on the Bush stone-curlew's survival (page 14)

**Optional** – Note access to shelter, food and water of other local protected species i.e. Koala, Rock Wallaby, Dugong. Add to the table on page 13.

**Part Two – A Field Walk - pages 5-9, 13-14**

Identify environmental factors that could affect the growth and/or survival of a Bush stone-curlew. Add to the table on page 13.

Use a Kestrel weather meter and a light meter to measure and record abiotic environmental factors such as wind speed, temperature, humidity and sunlight (page 5)

Construct a simple food chain that includes the Bush stone-curlew (page 7)

Understand the different roles of producers, consumers and decomposers within the Bush stone-curlew’s habitat and predict what might happen if one of these relationships is interrupted (pages 8-9)

Create a concept map to illustrate relationships and effect on the Bush stone-curlew’s survival (page 14)

**Optional** – Note access to shelter, food and water of other local protected species i.e. Koala, Rock Wallaby, Dugong. Add to the table on page 13.

**Part Three – Visit to the Magnetic Island Museum – pages 10-12, 13-14**

Explore natural and human causes of changes over time to the Bush stone-curlew’s habitat by comparing historical photographs of Picnic Bay with the same scenes today (kit provided).

Take photographs and describe the changes to the Bush stone-curlew’s habitat.

Recognise that human behaviours have had an impact on the Bush stone-curlew and list current threats to its survival.

Create a concept map to illustrate relationships and effect on the Bush stone-curlew’s survival (page 14)
There are three stages of development in the Koala’s life cycle. Write them here:

1. ........................................................................................................

2. ........................................................................................................

3. ........................................................................................................

The newborn koala is not very well-developed. Where does it spend the first months of its life? Make sure your answer is a complete sentence.

........................................................................................................

........................................................................................................

........................................................................................................

The koala belongs to a special group of mammals called

___    ___    ___    ___    ___    ___    ___    ___    ___
THE LIFE CYCLE OF CICADAS

Australia is home to an astounding variety of cicadas, and all but a handful of our more than 200 species are found nowhere else. To many, they are simply percussionists, producing a soundtrack for warm summer evenings, but they lead fascinating lives, both below and high above the ground.

1. That loud song
A cicada's song is made by the male—it's good for keeping predators away and is also its mating call. The cicada is the loudest of all singing insects and its noise is sometimes loud enough to repel birds. Whether singing takes place during the day, at dusk, or both, depends on the species.

2. Pairing off
As the male approaches a female he switches to a quieter call and mating commences. Females will usually mate two or three times, laying eggs in the few days between matings.

3. Underground
The cicada nymph spends at least nine months underground, feeding on sap and moulting up to four times. When it reaches full size and the conditions are right, the nymph tunnels its way to the surface.

4. Cicada Shell
The newly emerged cicada will climb and cling to a tree. Here it spends an hour or more shedding its crusty shell. It takes several more hours for its wings to become sturdy enough for flight and then it has a few weeks of flying freedom.

5. Cicadas tunnel upwards from their confirmed home until they almost break through the surface. Then they settle in and wait, regularly emerging a day or two after rain.

During their few weeks above ground, cicadas spend the hotter part of each day feeding on sap.
There are also three main stages of development in the Cicada’s life cycle. Write them here:

1. .................................................................
2. .................................................................
3. .................................................................

Cicada eggs are laid on a branch, but where does the cicada spend most of its life cycle? Make sure your answer is a complete sentence.

..................................................................................................................
..................................................................................................................
..................................................................................................................

The cicada belongs to the group of animals called

___ ___ ___ ___ ___ ___ ___

Amazing Cicada Life Cycle – David Attenborough
http://www.youtube.com/watch?v=tjLiWy2nT7U

Life Cycle of the Bush stone-curlew

1. Label each stage of the Bush stone-curlew’s life cycle.
2. Connect the stages with arrows.
3. Put a tick ✓ next to any of the stages of development you have seen on your field walks.

Call of the Bush stone-curlew
http://www.youtube.com/watch?v=RZWHUU41gsk
PART TWO – A FIELD WALK LOOKING AT ENVIRONMENTAL FACTORS OF HABITATS, FOOD CHAINS AND FOOD PYRAMIDS

On your second field walk, stop and observe an area of relatively undisturbed “bush” that could be habitat for the Bush stone-curlew.

Record your observations of the environmental factors that could affect this habitat:

<table>
<thead>
<tr>
<th>Environmental factor</th>
<th>Measurement/Observation</th>
<th>Measured by using</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wind speed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Temperature</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Humidity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sunlight</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Access to water</td>
<td>Observation</td>
<td></td>
</tr>
</tbody>
</table>

Non-living factors that affect habitats

Name: ____________________________

Environmental factors → How does this factor affect a habitat → Predict what might happen if there are extremes in these factors

- Too much rain
- Not enough rain
- Too much sunlight
- Not enough sunlight
- Extreme heat
- Extreme cold
FOOD CHAINS - Relationships and roles within the environment of the Bush stone-curlew

Your Connected Map and your retrieval charts are two ways of showing the relationships between living things in an environment. A food chain is another way. The drawing below shows a simple food chain. The arrows indicate the flow of energy.

We can also show the same information in text. When you show relationships between living things, don’t forget to show where all of our energy comes from – where do you think that is? This should be the beginning of your food chain.

An example of a food chain

(.......... THE START OF ALL OUR ENERGY?) ➔ GREEN LEAF ➔ CATERPILLAR ➔ BIRD ➔ SNAKE ➔ EAGLE

Read the information on the Bush stone-curlew below.

Where does it live?
The Bush Stone-curlew prefers relatively undisturbed grassland and grassy woodlands which have a good groundcover of leaf litter, fallen branches and tussock grasses for shelter, foraging and nesting. Roosting on the ground during the day, stone-curlews may travel up to 3km at night to feed.

How does it nest?
The Bush Stone-curlew nests under trees in open woodland, generally in a “scrape” on bare ground near fallen timber. Each breeding pair returns to the same area to nest year after year. As curlews nest on the ground, they can be eaten by predators which hunt by smell eg dogs, cats, goannas, snakes.

What does it eat?
Bush Stone-curlews feed mostly on insects, molluscs, centipedes, crustaceans, spiders, frogs, lizards, snakes, small rodents as well as some seeds and fruit.
Look back at any information you have collected so far:
- Your retrieval charts (pages 12 and 13)
- Your Connected Map (page 14)

Use this information to make a food chain below for the Bush stone-curlew.

If you have enough time, you can also try making food chains for these animals too:

Koala

Rock wallaby

Dugong

Cicada
FOOD PYRAMIDS - Relationships and roles within the environment of the Bush stone-curlew
A food pyramid connects lots of food chains together, and show "who eats who" in a habitat. The food pyramid below shows who eats who in the marine habitat (the sea) around Magnetic Island. Because humans eat fish, crabs and prawns, we are represented in this food pyramid. We may not be represented in all food pyramids.

The food pyramid has several “levels”. Marine plants like seagrass, seaweeds and mangroves, process the Sun’s energy into food for the next level up. Green plants are called producers. All of the animals shown within the pyramid are called consumers. Each level feeds on the levels below them.

Once an animal dies, or the leaves from the mangroves fall into the sea, they are broken down into nutrients by fungi and bacteria living in the water. The fungi and bacteria are called decomposers.
A food pyramid containing the Bush stone-curlew

Think about the Bush stone-curlew, where it lives, what it eats, and what might eat it! You can look back through this workbook for information.

Have a go at putting features of the stone-curlew's habitat on the levels of the food pyramid. Two producers have been added to get you started – grasses, leaves and fruits of trees. What animal consumers feed only on plants in this habitat? Put them in the lowest level of consumers.

Now, what animals eat the animals that eat the plants? These go in the next level up, and so on.

Don’t forget your decomposers. These can be either plants or animals, usually living in the soil, that break down dead and decaying plants and animals and release the nutrients back to the soil.

Use coloured pencils to circle each of the plants and animals you have added to the food pyramid:

- **RED** – things that assist the survival of the Bush stone-curlew
- **GREEN** – things that threaten the survival of the Bush stone-curlew
PART THREE – A WALK AROUND THE STREETS OF PICNIC BAY LOOKING AT CHANGES OVER TIME & A VISIT TO THE MAGNETIC ISLAND MUSEUM

PICNIC BAY – THEN AND NOW
We will walk around the streets of Picnic Bay, exploring the changes that have taken place over the last 120 years since European settlers have been coming to Magnetic Island.

- We will use **old photographs of Picnic Bay** to help us see those changes. These photographs have been supplied by the Museum and are available in the Paluma Environmental Education Centre’s activity called *Picnic Bay – Then and Now*.
- We will **make some notes and take some photographs** to help us remember what we’ve seen.
- We will look particularly for **changes to the habitat of endangered animals that live here**, like the Koala, the Allied Rock Wallaby, the Dugong and the Bush stone-curlew.

Our walk around Picnic Bay will take us past:
- Cottages in Magnetic Street, Barbara Street and Wansfell Street
- The location of the first holiday “resort” on the Island
- A house and other buildings along the Esplanade, including the Hotel Magnetic
- The beach, the jetty and the original Picnic Bay Life Saving Club
- Damage caused by 1971 Cyclone *Althea*
- We will end our tour at the former Picnic Bay State School, now a museum and craft centre

Make some notes to help you remember the things you see.

<table>
<thead>
<tr>
<th>Question</th>
<th>My notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. What changes to the original native vegetation were made by the establishment and plantings of the gardens, yards and street gardens?</td>
<td>●</td>
</tr>
<tr>
<td>2. What introduced garden plants have become pests in Picnic Bay?</td>
<td>●</td>
</tr>
</tbody>
</table>

Electricity and town water only came to Magnetic Island many years after European settlement of Picnic Bay. Sewage is still to be provided to every bay.

3. Before electricity, people cooked on wood-burning stoves and buried the waste from their pan toilets. How would these arrangements (collecting firewood from the bush, disposing of “effluent”) have affected the habitat of local animal species like the curlew and koala?

<p>| Note the changes in building materials for the holiday houses over the years e.g. bush timber, corrugated iron and a thatched roof. | ●        |
| 4. Where did the bush timber and palm fronds (for the thatched roof) come from? | ●        |</p>
<table>
<thead>
<tr>
<th>Question</th>
<th>My notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>The huts of the “health resort” and the lifesaving club house were built right on the beach.</td>
<td></td>
</tr>
<tr>
<td>5. How did building on the sand dune affect the beach?</td>
<td></td>
</tr>
<tr>
<td>6. Why do you think this beach was called Picnic Bay?</td>
<td></td>
</tr>
<tr>
<td>7. What services were provided along the Esplanade for tourists and visitors?</td>
<td></td>
</tr>
<tr>
<td>8. How would the construction of ever bigger jetties have affected the coral reef in Picnic Bay?</td>
<td></td>
</tr>
<tr>
<td>9. What changes have humans made to the habitat of animals living in Picnic Bay, like the curlew and koala, over time?</td>
<td></td>
</tr>
<tr>
<td>Buildings and the bush in Picnic Bay have been damaged by extreme weather events like cyclones over the 120 years we are studying.</td>
<td></td>
</tr>
<tr>
<td>12. What damage was caused by Cyclone Althea in 1971?</td>
<td></td>
</tr>
</tbody>
</table>

Now, add to your concept map on page 14 the effect any of these habitat changes have had on the Bush stone-curlew’s survival.
Instructions for completing the Connected Map

The *Connected Map* is a visual way of reflecting upon your observations and making connections between them. It is a quick way of making “mental notes” for ourselves. We will add to this each time we go for a field walk.

When making notes on your *Connected Map*, work in a small group of three or four. Each of you needs a pencil to build your own thinking map.

These questions will help your group start a conversation about everything you saw during this learning experience:

- What’s one animal or plant that you observed during this activity?
- What do you think it needs to survive?
- Write the animal’s (or plant’s) name down (or draw a quick picture – your choice).

Now write or draw the things the Bush stone-curlew needs to survive (for example, water). How can you record these connections?

Draw a line from each to the things it needs to survive, for example, if it’s something the stone-curlew eats, write ‘eats’ on the connecting line. Add in any other animals and/or plants that you observe in the environment. See how many connections you can make in your map.

Once your *Connected Map* has sufficient information recorded, sit in a shady spot and make some notes for yourself on these connections in the retrieval chart below. The first one is done for you, as an example.

<table>
<thead>
<tr>
<th>This living thing</th>
<th>Connects with or has a relationship with</th>
<th>That living thing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Example: A frog</td>
<td>Catches and eats</td>
<td>Insects</td>
</tr>
<tr>
<td>ANIMAL</td>
<td>Bush stone-curlew</td>
<td>Koala</td>
</tr>
<tr>
<td>-------------------------</td>
<td>-------------------</td>
<td>-------</td>
</tr>
<tr>
<td>FIELD WALKS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>On Magnetic Island</td>
<td><img src="image1" alt="Bird" /></td>
<td><img src="image2" alt="Koala" /></td>
</tr>
<tr>
<td>Conservation Status</td>
<td>Of Least Concern</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Features of the Habitat I observed</td>
<td>Curlew Walk A</td>
<td>Curlew Walk B</td>
</tr>
<tr>
<td>Shelter &amp; breeding sites</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Food &amp; water</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Threats to the animal’s survival</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Any observations or evidence of the animal – tracks, scats or sings</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Connected Map
Instructions and accompanying retrieval chart on page 12
Guide to making judgments — Mapping life cycles

Purpose of assessment: To understand how relationships of living things impact on their life cycle.

Understanding science
- Connects relationships to explain the survival of living things including interruptions to a life cycle.
- Describes relationships that assist and hinder the survival of living things.
- Describes key stages in life cycles.
- Identifies something that assists or hinders the survival of a living thing.
- Identifies stages in a life cycle.

Analysing and evaluating
- Proposes and justifies actions.
- Describes actions that have been influenced by science understanding.
- Identifies action in a familiar setting.

Investigating science
- Follows procedures to collect and present data.
- Uses research to support presentation.
- Records some information on a plant or animal.

Investigating science
- Communicates ideas and findings using simple reports and diagrams.
- Presents information.
- Explains links using science understanding.

Name: ___________________________
Teacher’s comments: ___________________________