GREEN ADELAIDE

Creature Features

Volume I

Government of South Australia

About this publication

Since 2013 Green Adelaide's Education team (previously called NRM Education) has produced a weekly digest distributed to teachers and other interested people subscribed to our email list. Most weeks we included a short creature feature that promoted a local plant, animal or fungus, usually connected to a season, environmental event or interesting date (for example Walk to School Day or Christmas). This publication brings together all of those articles for the first time.

As the articles were written to tie in with those seasons or events and they have been reproduced here with minimal edits, they may reference websites or other resources that are no longer available or to dates that have passed.

We hope you will find this resource useful and appreciate any comments. Visit our website for all contact details.

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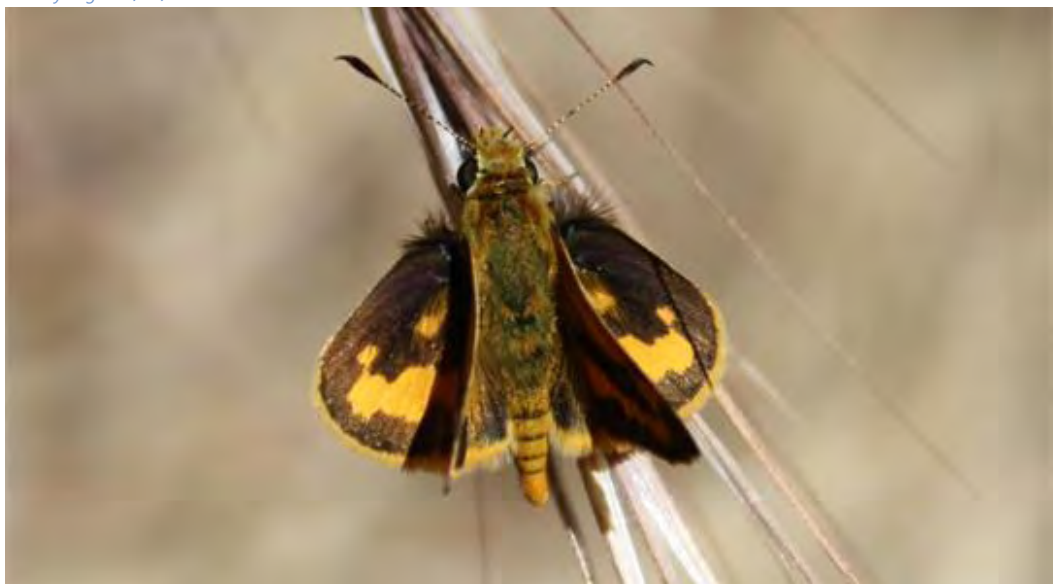
We do our best to check the toxicity of native plants featured in our Weekly Digest but please ensure you check the Department for Education Outdoor Learning Environments Standard for plants that are potentially poisonous, dangerous or that should be treated with caution, along with other references to determine if the plants are appropriate for your needs and conditions.

Insects, spiders, worms and other invertebrates



Southern Grass Dart (Photo: Jason Tyndall)

Darting about amongst the Kangaroo Grass

The Southern Grass Dart is a very common Skipper butterfly that is out at the moment. It is a bit bigger than your thumbnail and its host plants are generally any native or introduced grasses. However the native Kangaroo Grass, *Themeda triandra*, is the preferred host.

The Kangaroo Grass has copper seed heads and can grow waist high, the leaves remain a tuft over the winter (annual grasses die and only come back by seed whereas most natives are perennial). It is a good grass to use in gardens as it doesn't look too untidy and has good colour contrast. Best planted in clumps.

In relation to the host relationship between a butterfly and a grass, a good way to introduce students to it is to ask what type of mouthparts does a caterpillar have (chewing) and what mouthparts does a butterfly have (siphon or curly straw). Once they have determined the difference, the question to ask is 'Do you think they feed on the same thing?' The obvious answer is no.

Caterpillars need to chew on special leaves (such as grasses) and butterflies feed on nectar from a range of different flowers (which do not have the 'special leaves'). Adult butterflies taste with their feet and that's how they know where to lay the eggs.

If you want butterflies you need both host (mostly grasses) and feeding plants (most native flowers). A mixture of native grasses, shrubs, groundcovers and trees is the best composition.

You can download a free fact sheet on this and other butterflies at http://www.butterflygardening.net.au/butterflies/hesperiidae.htm

The stark 'eye-spots' of the Meadow Argus (Photo: (c) L. F. Hunt (Inset: the caterpillar of the Saltbush Blue blends perfectly with the salty leaf it's sitting on (c) R. H. Fisher))

April Fool's! – our clever Adelaide butterflies

Butterflies and their caterpillars use a variety of means to hide themselves from predators. Sometimes they literally hide out of sight; for example, under bark or on the underside of leaves. However, many species rest in more open situations and conceal themselves using techniques know as camouflage and disguise. Quite the April Fool's trick!

Camouflage describes something with a colour or texture that enables it to blend against a background. Butterflies and their caterpillars rest on many different substrates including leaves, stems, rocks and bark. Various species have evolved to possess colours and patterns matching the places they rest most often.

Disguise, on the other hand, describes a species that has a similar appearance to another natural object, such as a leaf or flower. Moths often have very effective disguises; some which rest on tree trunks resemble bits of lichen, others resemble bits of broken twig.

'Eye-spots' - disguise or deterrent?

Some butterflies have circular markings (*ocelli*) on their wings and it has long been thought that these markings had been evolved to scare off predators, by mimicking the eyes of the predators' own enemies. Scientists at the University of Cambridge in England are now saying this is not so, and that the marks work simply because they stand out. Many predators are wary of prey with striking patterns, because such patterns often warn of toxic substances. Why, then, do wing marks look so much like eyes and a very convincing disguise? The answer may lie in the process of wing formation. During butterfly development, the building blocks that cause wing cells to produce their colour can easily radiate from a central point, resulting in circular designs. Eye-like marks in the animal kingdom are often called 'eye-spots' but we may have to start calling them something else!

This article acknowledges content from Stevens, M; Hardman, C. J; Stubbins, C. L. (2008), Conspicuousness, not eye mimicry, makes "eyespots" effective antipredator signals, Behavioral Ecology, vol19, no 3, pp. 525-531.

Blue-banded Bee (Photo: Steve Walker)

Beeautiful tomatoes

Do you grow tomatoes in your veggie garden? Would you like to increase the yield and improve the flavour of those tomatoes? Well you may be surprised to hear that there is an easy solution; native bees!

Tomato flowers are normally self-pollinating. However, one of our more well-known native bees, the Blue-banded Bee, does a spectacular job of improving the pollination of tomato flowers, as well as a range of other flowers in the veggie garden.

The Blue-banded Bee is what is called a buzz pollinator; it hangs on a flower, tenses it wing muscles, buzzes and shakes the pollen out. Introduced honey bees don't have that behaviour, hence they play no role whatsoever in pollinating tomatoes.

Tomatoes pollinated by Blue-banded Bees have been shown to contain more seeds than self-pollinated tomatoes. That is important because the seeds are where all the flavour is!

Of course it is selfish to think that native bees are just useful to help us with our tomato crops, they are actually an essential part of our natural environment. A huge range of native flowering plants rely solely on native bees for pollination.

There are about 3000 species of native bees in Australia. They are solitary, and as such don't live in hives. They are non-aggressive and tend not to sting. In fact, some can't sting. Some native bees nest in the ground whilst others nest in twigs, hollows, stems and crevices.

There are a number of things that you can do to encourage native bees in your garden. Firstly, don't use insecticides when there are flowers present, even systemic insecticides are damaging as the systemic chemicals travel through the plant and get in the pollen and nectar. Secondly, leave some bare areas of un-mulched soil so that ground-nesting bees can nest. For the native bees that nest in wood, crevices etc you can create artificial homes for them. There are numerous possible designs that attract a range of different bees. Finally you can make sure that you have flowers in your garden at all times of the year, especially native flowers.

A Hawk Moth caterpillar with its 'true' legs and 'pro' legs

Butterflies may have the wings but caterpillars have the legs

Many of us have butterfly gardens at our learning sites.

A butterfly garden is characterised by two key components; host plants for caterpillars (to chew with their chewing mouth parts) and flowering plants suitable for adult butterflies (to sip nectar with their curled mouth parts).

When looking at butterflies and caterpillars you could be forgiven for thinking they were unrelated if you didn't know about the butterfly lifecycle. Upon closer investigation you can see they share a number of similar features, one of which is the number of real legs they have - six.

As with all insects, caterpillars and butterflies have 3 pairs of true legs with have joints and segments like our knees and ankles. However, caterpillars can also have up to 5 pairs of pro legs, which do not have joints or segments, totalling to 16 legs!

All these extra legs are needed to do just one job – get the caterpillar around so that it can eat. If a caterpillar doesn't eat enough food it may not be able to complete metamorphosis and transform into an adult butterfly.

During its caterpillar stage, this little creature can eat up to 27,000 times its body weight! In addition to the extra legs, caterpillars also have as many as 4000 muscles (compared to just 629 in our bodies) which helps them eat as much food as they need to turn into butterflies.

Speaking of legs, this Friday 24 May 2013 is Walk Safely to School Day an annual, national event when children are encouraged to walk safely to school. It is a Community Event seeking to promote Road Safety, Health, Public Transport and the Environment.

Captive-bred leeches from the International Medical Leech Centre in Russia

Vampire worms save lives

Each year on 14 June the World Health Organisation celebrates World Blood Donor Day. Its aim is to 'raise awareness of the need for safe blood and blood products and to thank voluntary unpaid blood donors for their life-saving gifts of blood'. This year is the 10th anniversary of World Blood Donor Day and the campaign will focus on the value of donated blood to the patient, not only in saving life, but also in helping people live longer and more productive lives.

In nature there is a large range of creatures that rely on blood as a form of nourishment. One of the most well-known is the leech. Leeches are a type of segmented worm (other segmented worms include earthworms and bristle worms) and there are four species known in South Australian inland waters. Over 500 species are known throughout the world.

Although many people are disgusted by leeches, they have been used in medicine for thousands of years. Today, captive-bred leeches are used in microsurgery to drain congested blood from wounds, especially in skin grafts and reconstructive surgery.

Leeches can be easily identified by their suckers – one at each end – which aid in locomotion. They anchor with the rear sucker, stretch forward and anchor with the front sucker and then release the rear sucker and contract towards the front sucker. This process is repeated to allow them to 'inch' along. Some species are also strong swimmers.

Although many leeches suck blood, some are predators which eat other aquatic invertebrates. A blood-sucking leech produces saliva which contains both an anaesthetic and an anticoagulant to numb the bite area and prevent the blood clotting.

A leech can drink as much as five times its body weight at a time. Some leeches are thieves, stealing the blood from other leeches!

Black Woolly Bear Caterpillar and its adult form the Black and White Tiger Moth (Photos: Toby Hudson).

Red nose, furry body

This Friday is Red Nose Day, the major fundraiser for SIDS and Kids, where partcipants help to raise awareness and money by wearing a bright red nose for the day. One of our backyard companions that could be taking part is the Woolly Bear Caterpillar. These furry looking caterpillars appear to have a bright red nose. Well, not wanting to spoil a good story, but the reality is that it is their whole head that is reddish in colour.

There are a few different types of Woolly Bear Caterpillars and although a lot of us are familiar with them, not many people know what they look like in their adult form. They are not actually butterflies, but moths.

The Black Woolly Bear Caterpillars usually seen in our gardens transform into the Black and White Tiger Moth, *Spilosoma glatignyi*. They are a native species found throughout the southern half of Australia and, as the photo above shows, their wings are white with black spots. Their bodies are black and orange.

Woolly Bear Caterpillars appear in winter and they love to eat a wide variety of garden plants. The job of the caterpillar is to grow, nothing else matters. All the energy they consume is directed toward growing, hence the desire to eat and eat and eat. Only once they are an adult moth do they concentrate their efforts on reproduction.

The voracious appetite of the caterpillar is the reason that many people are not too fond of having them in their garden but, unless you have plague proportions of them, it is probably best to leave them be.

If you do want to remove them from your garden then physical removal can be quite effective and has the added benefit of avoiding the use of insecticides or other sprays.

The Yabby, Cherax destructor [inset: female Yabby showing eggs under the tail] (Photos: Jeremy Gramp).

Populations suffering shell shock

Since 1989, the United Nations has observed 11 July as World Population Day. The day aims to draw attention to the need to develop plans and programmes to address the issues associated with the expanding global human population, which currently stands at more than 7 billion people.

A local species which has the opposite problem is the Yabby, *Cherax destructor*, which is listed as a vulnerable species under the IUCN (International Union for Conservation of Nature) Red List of Threatened Species.

The Yabby is a freshwater crayfish which can reach a maximum size of about 20cm and reaches sexual maturity when approximately 2 years old. Like most crayfish, Yabbies mate face to face, with the male holding the female down with his pincers. After mating, the female carries the eggs, which may number as many as 1200, under her tail which she will curl up in order to hold the eggs (see photo inset). The eggs are also supported by extra limbs called pleopods or swimmerettes on the underside of the tail.

The female protects the eggs carefully and also fans them to keep them well oxygenated. After hatching, the juvenile Yabbies will continue to be looked after by the female for a few weeks. As a result of this parental care, Yabbies produce much less offspring compared with the thousands produced by marine lobsters.

Yabbies with eggs are typically found between October and March and, in most states, are protected when eggs are attached. It is an offence to physically remove eggs.

If you want to find out if there are Yabbies or other aquatic macroinvertebrates in your local waterway, why not get involved in our Engaging with Nature program?

Red water mite larvae on a dragonfly (Photo: (c) K.P. McFarland)

Hitchin' a ride

Tomorrow is National Ride to Work Day, which encourages people who have never ridden to work, or who do so infrequently, to commute on their bike. Bike riding is a great way to get physically active – and it's a great, healthy habit to get into!

In nature, many organisms take the easy way out by hitching rides on other wildlife or objects; one interesting example is the water mite, which has a very complicated life cycle (varying between species) which includes two separate metamorphoses!

Typically, adult water mites mate and lay eggs attached to submerged vegetation. From these eggs, 6-legged larvae hatch out and swim through the water until they find and attach to the outside of a suitable aquatic insect, such as a dragonfly or damselfly. Once attached, the larva will be a parasite, drinking the blood and body fluids of its host. This parasitisation serves two purposes; as a source of nutrition and also as a method of dispersal.

Once the larva has fed enough, it will detach from its host and enter an inactive, stationary phase known as a protonymph. In some species, the protonymph will stay attached to the host. The protonymph phase is similar to an insect pupal phase – it retracts within its exoskeleton and undergoes metamorphosis into an 8-legged deutonymph. The deutonymph emerges from the bag-like exoskeleton as a predator, which swims around feeding upon the body fluids of other aquatic organisms. The deutonymph has a relatively soft exoskeleton, which enables it to grow considerably in size. The deutonymph looks just like the adult water mite, but has no reproductive organs. When the deutonymph is fully grown, it enters another inactive, pupa-like phase called the tritonymph, once again retracting into its exoskeleton and undergoing metamorphosis.

After metamorphosis, the fully developed adult water mite will emerge out of the bag-like exoskeleton. The adult is also a predator, feeding on the body fluids of aquatic organisms. Adult water mites often have elaborate courtship rituals before mating. And you thought being a human was complicated!

If you want to investigate our local water mites and other aquatic bugs, why not get involved in our Engaging with Nature program?

Examples of two Canadian Mayflies - adult and (inset) nymph. Photographs (c) Stephen Luk

A short life on the wing

Mayflies are the most primitive winged insects, with fossils dating back 300 millions and they get their name from the fact that, in the northern hemisphere, adults emerge en masse during the month of May.

They are members of the insect order Ephemeroptera, the name of which is derived from the greek words 'ephemer', meaning living just a day, and 'pteron', meaning wing. This is due to the fact that they have an extremely short adult life.

While they may remain in the larval or nymph stages for many months - from two weeks to just under a year for South Australian species - the adult stage is considerably shorter. Some females emerge, mate and die in just a few minutes, others live several weeks.

While nymphs mainly eat algae and other decomposing material, adults do not have a functioning digestive system, so do not feed.

Mayflies are considered very sensitive to pollution (with a SIGNAL score of 9 out of 10), so they are used as an indicator of water quality and environmental health.

If you would like to find out more about mayflies and other aquatic creatures in your local area, why not have a go at catching and observing them with your students? We have a range of identification charts and teacher resources online, or you can borrow equipment and other materials from our loan library.

A Common Back Swimmer (Notonecta glauca) in Germany (Photo by Regani)

The best back swimmer in town

If you have ever had the chance to look for water bugs, you probably would have come across a back swimmer. Back swimmers are very common to most freshwater bodies, as they are tolerant to pollution and salinity, and are often one of the first bugs found in a new water body (early coloniser). As the name suggests, they swim on their backs using their hind legs as 'oars'.

A cool fact about back swimmers is they carry a bubble of air on their body so that they can breathe underwater.

Back swimmers are gruesome creatures which wait to see or feel vibrations of an unsuspecting insect, tadpole of small fish and use their hind legs to capture their prey. Then they pierce the prey with their mouthparts to suck out their body juices like sucking a milkshake through a straw.

Why don't you go looking for water bugs with your class to celebrate National Water Week (19-25 October). Below are two units of work developed by NRM Education on water bugs.

Learning about water bugs – An Early Years investigation into freshwater environments as special places; assessing water quality by learning about macroinvertebrates and making site improvements (627kb docx)

An investigation into biodiversity through macroinvertebrates and water quality for Years 2-7 (173kb docx)

Reference:

- Critter catalogue; a guide to the aquatic invertebrates of South Australian inland waters.

There are numerous species of Huntsman found in and around Adelaide (Photo: Jeremy Gramp).

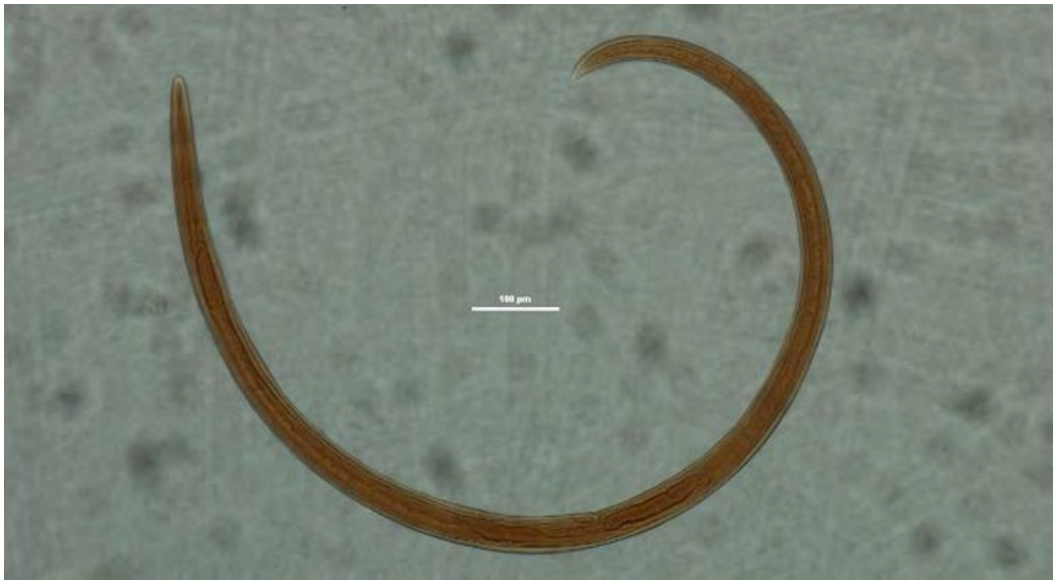
Quick, leg it!

Some people find spiders quite creepy, but no matter what your opinion you have to admit they are incredibly fascinating and are an essential part of our environment. Despite some common misconceptions, spiders are not insects (which have six legs and three main body parts). Instead, they are arachnids with eight legs and only two main body parts, the abdomen and the thorax. They also have huge brains, approximately 30% the size of their body, which enables them to effectively control their legs as they move about the place.

An interesting fact provided by Mike Gemmell from the SA Museum is that the average suburban garden in metropolitan Adelaide may contain as many as 200 different species of spiders, with a concentration of 2000 animals per square metre! One of the more well-known of our local spiders is the Huntsman. There's actually a number of species of these spiders in Adelaide and the Mt Lofty Ranges, and they are commonly found living under loose bark on gum trees, in logs or crevices and under rocks. They are also notorious for occasionally finding their way into houses and cars.

They are generally considered harmless; however in the rare instance that they do bite a human they can inflict a quite painful bite. A female Huntsman in particular can become quite defensive when she is protecting her egg sac. A Huntsman doesn't build a web. Instead it hunts and forages for food, using its stealth and speed to catch prey, mostly consisting of insects and other invertebrates; including species, like cockroaches, that humans consider pests. Therefore Huntsmen are widely considered to be extremely beneficial. Like all spiders, Huntsmen have to moult in order to grow, so you may occasionally find their old skin and mistake it for the actual spider.

In the near future NRM Education will be releasing a terrestrial invertebrate identification chart which will feature Huntsmen, along with 30 or so of the more common invertebrates that you'll find in your school or home garden. We will let you know when it is available. In the meantime, enjoy watching the Huntsmen and other fascinating spiders around your schools and homes.



Dagger nematode, Xiphinema americanum (Photo: Zeng Zhao, Landcare Research)

A well-rounded worm

As it is the international year of healthy soils, we think it's worth giving shining the spotlight on some of the lesser known inhabitants of our region. There are thousands of species of nematodes, also called roundworms, living in soils, and scientists have even found 4.4 million nematodes in a single square metre! Nematodes can also live in water or be parasitic. Free-living nematodes are typically microscopic, but the largest parasitic species is over 1 metre long!

People often think of nematodes as pests because some attack plants like tomatoes, chillies and cucumbers. The best way to control these undesirable nematodes is through crop rotation (changing where you plant things). The well-known heart worm, which is transmitted by mosquitoes and affects dogs, wolves and foxes, is nematode. However some species are very beneficial. There are many nematode species that decompose soil and can also be found in your compost bin. They improve soil structure by creating spaces in the soil as they move and they can also help disperse fungi and bacteria through the soil. Some other useful species are parasitic; getting inside the pest insect or a pest nematode's body and releasing bacteria from their gut to kill it. Others are predatory, using their mouthpieces to pierce the cells of fungi or bacteria to suck out their contents.

When some species face unfavourable conditions, such as dehydration, they enter a state of hibernation, called cryptobiosis. They can remain in this state for months or years, until the conditions become more favourable. Nematodes can be found in hot desert soils, and soils on the highest mountains.

References:

- http://www.dpi.nsw.gov.au/__data/assets/pdf_file/0015/41640/Nematodes.pdf
- http://www.abc.net.au/gardening/stories/s2534493.htm
- http://www.organicgardening.com/learn-and-grow/nematodes?page=0,0
- The waterbug book by Gooderham and Tsyrlin p.36
- Critter Catalogue p.22-24

Rain Moth pupal case and adult moth (inset) [photos © Arthur Chapman, flickr]

The Rain Moth

"What's that sticking up out of the ground"?

It's a familiar sight across school grounds and gardens around Adelaide after heavy rain, the empty pupal cases of Rain Moths (*Trictena atripalpis*) sticking up out of the ground. The caterpillars of the Rain Moth live in tunnels in the ground where they feed on the roots of Australian native species such as Eucalypts and Casuarinas. Fishermen like the caterpillars because they are great bait for fishing. Adults emerge from their pupal cases after heavy rain.

Rain Moths are large; they can be the size of small insectivorous bat and, due to their size, they are an attractive meal for owls. They have grey-brown wings with flashes of white across each forewing. Males have a wingspan of 100-120 mm, and females have a larger wingspan, 150-170 mm. The females produce up to 40,000 small eggs that are scattered while flying.

Rain Moths are found across southern Australia in woodland areas bordering creeks and gullies, especially where Eucalypts are found. Rain Moths are herbivores and their flight months are April to June.

There are over 1000 species of moths found in and around Adelaide. You can help us learn more about these little-known animals by creating butterfly and moth gardens at your school and in your home garden. Contact Butterfly Conservation SA with your moth observations and make a contribution to their quarterly newsletter and website.

References:

- http://lepidoptera.butterflyhouse.com.au/hepi/atripal.html
- http://bie.ala.org.au/species/Trictena+atripalpis
- http://www.butterflygardening.net.au/

An adult Longicorn Beetle (Photo: Steve Walker)

Miners for a heartwood of gold

Have you ever seen an oval shaped hole in the trunks of Eucalypts and wondered what made it? It's the calling card of a white grub or larvae that has fattened itself up on the heartwood of the tree and eaten its way out. It then turns into the big horned beastie known as the Longicorn or Long-horned Beetle.

Longicorns get their name from their antennae that look like a pair of horns, often swept around, or back along their bodies. These antennae are often longer than the beetle's long body, sometimes up to three times the length of the body.

The female beetle lays her eggs under, or in the cracks of, tree bark and the resulting larvae have large, strong mandibles or eating appendages to chew wood. Some Longicorns live on dead timber while other species prefer live timber. Some are surface miners running trenches along the tree trunk just under the bark, which can be seen as a network of trails on the trunks of dead trees once the bark has dropped. This boring or ringbarking can kill the tree.

Longicorn Beetles are found all around the world, with about 1200 species native to Australia. As well as Eucalypts, Longicorns feed on other native trees and flowers and can become an agricultural pest.

The white larvae of the Longicorn Beetles are often wrongly called witchetty grubs. True witchetty grubs are the larvae of a Central Australian Cossid Wood Moth and called 'witjuri' by the Adnyamathanha people of northern South Australia.

References

- http://www.brisbaneinsects.com/brisbane_longicorns/ - Longicorn Beetles - FAMILY CERAMBYCIDAE
- https://www.anbg.gov.au/gardens/visiting/exploring/fauna/insects/beetles-ANBG.html - Common Longicorn Beetle (Phoracantha tricuspis)
- https://www.daf.qld.gov.au/forestry/pests-and-diseases/longicorn-borers - Longicorn Borers
- http://australianmuseum.net.au/beetles-order-coleoptera - Beetles: Order Coleoptera
- http://australianmuseum.net.au/witchetty-grubs - Witchetty grubs

A stonefly nymph from the United States (Photo: Dave Huth, flickr)

Life's not all plain sailing for stoneflies

Friday 18 September is World Water Monitoring Day, a day that aims to build public awareness and involvement in protecting water resources around the world by empowering citizens to carry out basic monitoring of their local water bodies. If you undertake water quality monitoring in some of the cleaner waters in Adelaide and the Mount Lofty Ranges you might be lucky enough to come across a nymph of one of our stoneflies.

Stoneflies are known throughout the world, but there are only nine species recorded in South Australia, especially in the cooler, flowing waters in the upper reaches of the catchments. They are regarded as very sensitive to pollution, so finding them is a great indication that the water quality is good.

They are an interesting species to watch because they tend to crawl along the rocks and vegetation in the water rather than swim, but when they do it is hilarious. They swim in a rather ungainly fashion by wriggling their bodies from side to side, making them look very unsuited to the aquatic environment.

They can take from a few months to a couple of years to develop into adults, but once they do they only live for a short while – a few days to about 3 months – so they need to find a mate quite quickly.

Most adults are able to fly, but not all species are very good at it. One species can only fly when it is warm and another cannot flap its wings, so it has to open them up like sails to trap the wind and be blown across the surface of the water like a yacht!

Reference:

- EPA Critter Catalogue

The native Blue Banded Bee (Photo: Remko Leijs)

What's the buzz on native bees?

When talking about bees we often think of a European Honey Bee, or the European Bumblebee. But did you know Australia is home to up to 1,650 native bee species? With at least 200 different species found in the Adelaide hills?

European honey bees were introduced in Australia in the 1920s for honey production, as native bees do not store nectar. Today, having escaped from their hives, honey bees are now feral in Australia and whilst they help to pollinate crops, they also out-compete native birds and mammals for food and nesting sites in tree hollows.

Native Australian bees vary in shape, coloration, nesting habits, behaviour and flower preferences, and can range in size from just 2mm long to 25mm long! Unlike the social Honey Bee that requires a hive, most native species (with few exceptions) are known as solitary bees, and will work and nest independently. Some bee species only nest in the ground, sometimes sharing a central entrance point that branches off into many independent bees' nesting tunnels within. Other bee species will only nest in natural hollows such as rock crevices, old borer's holes or dig into soft timber or stems of plants.

Active from September through to April, native bee life-cycles can range from 4-6 weeks for some species, and up to a year for others. Native bees are also important pollinators for many of our native plant species that can't be pollinated by honey bees – all the more reason to encourage them into your garden!

To support native bees in your garden, learn how to make bee hotels, nesting walls, select the right native plants and build an insect spiral.

References:

- http://www.discoverycircle.org.au/building-a-native-bee-hotel/
- http://kersbrook.landcaregroup.org.au/?q=node/1255
- http://southaustraliannativebees.webs.com/pollination.htm

A sea star at Hallett Cove Beach (Photo: Sam Ryan)

Hey now, it's a sea star

The common name sea star is preferred to starfish because these amazing marine creatures are not fish; instead they are closely related to sea urchins and sea cucumbers.

There are many species of sea stars, all of which have radial symmetry and five or more arms. Sea stars have tube feet that are either suckers (in species which stick to the rocks) or pointed (in species which burrow). They use their tube feet to move around a bit like a caterpillar or millipede does.

Some sea stars prey on cockles and they use their tube feet to pull on the cockle shells, which may take several hours. The constant pressure on the shell eventually causes the cockle to tire and open. The sea star can then throw its stomach out of its mouth to grab the cockle and bring it back into its body.

Some species of sea stars like the Allostichaster polyplax can split in half and regenerating their missing parts! They are able to do this because their vital organs are in their arms. Other sea stars have spikes to discourage predators.

Next time you are snorkelling or walking along a rocky shore keep your eye out for a sea star.

References:

- Marine invertebrates of Southern Australia Part 1 edited by S Shepherd and I Thomas 1982
- Australian marine life; the plants and animals of temperate waters by G Edgar 1997
- National Geographic

Goolwa Cockles are found along the sandy shores of the Coorong and the Eyre Peninsula

Eeny, meeny, miny, moe, catch a Pipi by the toe!

Goolwa Cockles, also known as Pipis or *Donax (Plebidonax) deltoides*, are found along the sandy shores of the Coorong and the Eyre Peninsula. Hidden amongst the surf, you can find Pipis by simply wriggling your toes down into the sand where they are buried.

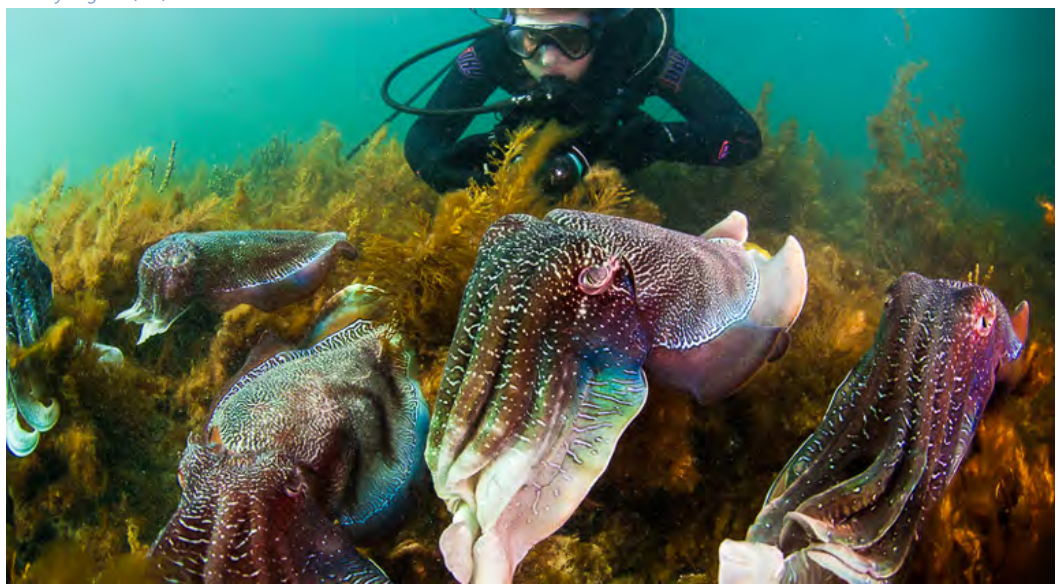
Goolwa Cockles belong to the bivalve class; bi meaning two, and valve meaning shell. If you are lucky enough to find one, you will notice its' distinct shape and hinged double shell, purple on the inside and white-pink on the outside. Bivalves like to bury themselves a few centimetres below the sand using a muscle that pokes out of the shell, called a 'foot'. As an important food source for many animals including fish and seabirds, they are also able to move with the tide and rebury themselves to avoid predation.

Goolwa Cockles were historically an important part of the diet of local Ngarrindjeri people in the Coorong region and are both recreationally and commercially harvested for use in restaurants and as fishing bait today. Over-fishing of cockles however has placed the population under threat, leading to bag and size limits being introduced to ensure young juvenile cockles are left to mature for the next season.

For more information refer to the Goolwa Cockle Bioregion Fact Sheet. Better yet, why not visit Goolwa Beach, take your shoes off and see what you can wriggle up?

Reference:

- PIRSA - Pipi fishing season media release



The radiant Giant Cuttlefish (Photo: Carl Charter)

Under the sea

There are many mysterious, weird and wonderful creatures in our oceans and the Giant Cuttlefish is a great example. During breading season they have the ability to alter their skin colour and texture for camouflage and as a mating display. Spawning males are very cunning, using stealth, brilliant colour and light displays and deception to attract a mate and small males sometimes disguise themselves as females to avoid competition with larger males, then sneak in and mate with the female closest to them!

The spawning of Giant Cuttlefish has become a significant eco-tourism attraction in South Australia, particularly when they gather at Black Point near Whyalla each winter to mate in great numbers. It is the largest gathering of cuttlefish known in the world.

The Giant Cuttlefish is a cephalopod, the class of animals that includes squid and octopus. Males can grow up to 60 cm long and weigh up to five kg. They have 10 tentacles; this includes eight regular ones and a pair of specialised hunting tentacles. When hunting, these special tentacles shoot out from sockets near the eyes and pull prey into their mouths. They use their strong beaks to crush mollusc and crustacean shells. They also eat small fish.

The lightweight, white cuttlebone often found washed up on beaches is an internal structure used by cuttlefish to control buoyancy. Cuttlefish also have the ability to move backwards using jet propulsion.

Watch a video of the giant cuttlefish here or download the Life in our bioregions cuttlefish fact sheet.

More Life in our bioregions fact sheets are available here.

Key words: features of animals and plants; camouflage.

Australian Painted Lady (Photo: Jeremy Gramp)

Painted Ladies spotted

From Spring to early Summer, the patterned black, white and orange Australian Painted Lady can be seen flitting amongst the daisies and searching out your best nectar-producing flowers.

Also known as Blue-spotted Painted Lady or by its botanical name *Vanessa kershawi*, this colourful butterfly is known for its ability to adapt to most garden plants and weeds to raise its caterpillars, and can be commonly found visiting flower beds across the suburbs of Adelaide.

A part of the Nymphalidae family, the Australian Painted Lady is a migratory species and most commonly attracted to a native paper daisy known as Common Everlasting or *Chrysocephalum apiculatum*.

Strawflower, Wirewort and other Everlasting species (along with some invasive pasture weeds) are the preferred food plants for their caterpillars. The Australian Painted Lady will lay her eggs on or near these plants to allow the caterpillars to eat the soft green parts of the plant.

The next time you go into your school or home garden, try our Native Plants ID Chart to find out what caterpillar food plants you have. Will you see a Painted Lady amongst the daisies this Spring, or perhaps another butterfly?

Reference:

- Butterfly Conservation SA Inc.

Keywords and phrases: butterflies; lifecycles; seasons; camouflage; food webs; effects of human activities; habitat loss; effects of introducing new species; living things depend on each other; features of animals and plants.

Damselfly adult and [inset] larva (Photos: Steve Walker)

This damsel's not in distress

Damselfly larvae are a common aquatic macro-invertebrate in our wetlands, creeks and rivers. In their larval and adult form, they have much in common with dragonflies, as they are both from the same order of classification – Odonata.

The larvae are usually sit-and-wait predators, and with their large eyes and an extendable 'labium' that shoots out from beneath their head, they can catch prey such as macro-invertebrates, tadpoles and small fish.

Damselflies are pretty tough, but you won't find them living in really polluted waters. Scientists can find out how healthy a creek or river is from analysing which creatures live in it, as they provide a longer record of conditions than taking a single chemical test.

If you're interested in investigating the biodiversity of aquatic macro-invertebrates in your local creek or wetland, have a look at the NRM Education inquiry units for Early Years or Years 2-7; the teacher information pack; and identification key.

Finding out what does and doesn't live in our local river or creek allows us to decide whether we need to take action to increase habitat or reduce pollution. That's what World Rivers Day is all about, celebrating the value of rivers and encouraging people to take care of them, so why not visit your local river or creek on Sunday 25 September 25?

Reference:

- South Australian Critter Catalogue

Key words and phrases: food webs; classification; features of plants and animals; effects of human activities; science informs changes in human practices.

Globally, there are over 2700 recorded species of soldier flies, including the Garden Soldier Fly (Exaireta spinigera) pictured above (Photo:Jeremy Gramp).

Tinker, Tailor, Soldier, Fly

November 6 marks the International Day for Preventing the Exploitation of the Environment in War and Armed Conflict. Therefore, in this creature feature edition we discuss the behaviour and life of a local fly family, known colloquially as the Soldier Fly.

Globally, there are over 2700 recorded species of soldier flies. Adults are terrestrial but larvae can be either terrestrial or aquatic, depending on the species. In Australia, most soldier flies have terrestrial larvae; the exceptions being some species in the genus Odontomyia, which is described below.

Adult soldier flies resemble wasps, but they don't bite or sting. After mating an Odontomia female will lay up to 200 eggs in a shallow pond or stream, or even in the hollow of a tree that has collected rain water. The larvae are hardy and can live within polluted waters in both fresh and saline environments. However they are poor swimmers and tend to drift with the movement of water or slowly crawl along the sediment at the bottom of the pool. Soldier fly larvae survive by collecting and feeding on decaying matter and algae.

Prior to reaching adulthood and being able to fly, the larvae leave the water to pupate, which may take up to four weeks. It is thought that adults mate on the day they emerge from the pupa, and only live for a few days. During this time they may not feed on anything at all. You are most likely to see soldier flies during the warmer spring and summer months.

Interestingly, there have been attempts to breed and harvest the larvae of a different soldier fly within Australia, the introduced Black Soldier Fly. The Black Soldier Fly is used in humid environments within Asia and North America because the larvae are voracious feeders and can easily dispose of food waste. The larvae are then used as food stock for agricultural and aquaculture purposes. This model is seen as one answer to manage the huge amounts of food waste generated within wealthy countries while simultaneously providing a food source for animals, such as chickens and fish, which we as humans eat.

Thus far, Black Soldier Fly breeding and harvesting programs within South Australia have been unsuccessful.

Don't be afraid of the big, bad wolf spider (Photo: Jeremy Gramp)

Cry Wolf – but they're lurking out there

There are over 2,300 species of wolf spider worldwide. Wolf spiders are found throughout Australia and they live in a wide range of habitats from the dry inland areas to wetter hills and coastal areas. They live alone and are agile hunters with exceptional sight. Their colouring varies from dull brown through yellow, grey or black to white and mottled.

They are often easy to identify because of their raised convex heads, which have eight eyes in three rows on top. The eyes reflect torch light brightly at night and often make you think that the animal behind the eyes is bigger than it is.

Wolf spiders live on the ground in leaf litter or burrows. They don't use webs to catch their prey; instead they are agile hunters that chase after prey or wait to catch it. They will often jump on prey then roll over onto their back, while holding the victim with their legs and biting it.

Females spin an egg sac, which they carry around with them until spiderlings hatch. The spiderlings then climb onto their mother's back, where they'll stay for several days as she moves around.

So next time you are out in the garden or other open spaces at night, take a strong torch and try shining it around. Chances are if you see a set of bright eyes on the ground there will be a wolf spider behind them, looking for ground-living invertebrates, including spiders, for dinner.

References:

- Australian Museum
- http://ednieuw.home.xs4all.nl/australian/Lycosidae/Lycosidae.html
- Wikipedia

When resting, Tau Emeralds hang vertically with wings extended at right angles (Photo: Steve Walker)

Vagrant seen in the wetlands

If you have managed to get out around a few wetlands lately you may have seen a variety of species of Odonata (dragonflies and damselflies). You will find the Tau Emerald (*Hemicordulia tau*) patrolling most freshwater environments, in rivers, creeks, wetlands, estuaries or dams in the warmer months from January to March.

This common dragonfly is known as a vagrant, which means they are wanderers and not permanent in any location. Tau Emeralds are excellent fliers and rarely rest, but when they do they hang vertically with wings extended at right angles. The marking on the frons (nose) is yellow with a black T marking, while there are metallic blue/green markings on its yellow abdomen along its 5 cm long body. You can use aquatic macroinvertebrates, such as dragonfly nymphs, to get an estimate of the amount of pollution in a waterway. A very polluted stream will have only a few types of macroinvertebrates living there, while a less polluted stream will usually have more invertebrate species. Dragonfly nymphs are very tolerant to pollution with a sensitivity of 3 (out of 10).

Why not get students to observe, record and report on the life cycle of a dragonfly nymph, sourced from your local area. For more ideas on incorporating dragonflies and macro-invertebrates into your classroom check out our teacher information pack. Complete sampling kits including nets can be borrowed from NRM Education, contact your local team for details.

References:

- http://esperancewildlife.blogspot.com.au/2010/02/tau-emerald-dragonfly-hemicordulia-tau.html
- https://theinsectdiary.blogspot.com.au/2015/01/australian-emerald-and-tau-emerald.html
- http://natureglenelg.org.au/dragonflies-and-damselflies-part-3/

Keywords and phrases: effect of pollution; features of animals and plants; consumers; water cycle; migration; living things live in different places.

The distinctive powerful mandibles and large eyes of the Inch Ant (Photo: Jeremy Gramp)

The 'Jaws of Life' for our terrestrial ecosystem

Australia is one of the world's hot spots for ant diversity. It is estimated that there are over 6,500 species of ants in Australia, with only one fifth of those currently being described.

Due to the sheer number of species, the fact that they generally run around quite quickly and that they are small in size, it can often be quite a challenge to identify them.

There are, however, ants that are so distinctive that they are very easy to identify. One of these that lives in our region is the Inch Ant (*Myrmecia pyriformis*).

Inch Ants are one of Australia's largest ants, with female workers not surprisingly growing to 1 inch long (actually about 2.6 centimetres long, but that is close enough to an inch). The males are slightly smaller.

They have large eyes with incredible vision for their size and are able to spot, track and follow intruders from as far away as one metre. They have very prominent powerful mandibles, or jaws, that contain 'teeth' along their inner margin, which can give a nasty bite. Not only that, they also have a sting at the tip of their abdomen that is able to inject venom multiple times in quick succession. When attacking the ant will hold on to its prey with its mandibles and curl its body underneath to use its sting.

Although you can find them during the day, they are actually a nocturnal forager, so you are far more likely to spot them from dusk to dawn. They usually forage on their own, although they do live in colonies.

Inch Ants play a very important role in an ecosystem by balancing the food chain and breaking down carrion. Although there is a small chance of humans being stung by Inch Ants, they are incredibly important to have around, so it is best to leave them alone to go about their business.

The Orange Legged Swift Spider and the Gum Tree Shield Bugs it mimics (Spider photo: Elisia Banks, Shield Bug photo: Steve Walker)

A spider came into my parlour

"Eeeek", I shrieked as I walked into my bathroom one warm spring afternoon. Lurking in the sink was this colourful critter (see picture above left), certainly not something I was expecting!

Spiders are ancient animals and often incite fear or fascination in humans. I was intrigued, took a couple of photos and, as I'd never spied a spider like this before, I started researching. I discovered I'd encountered the Orange Legged Swift Spider (*Suppuna picta*) which is identified by its orange front legs; the rest of the body is usually black with white markings, with some colour variations, including gold or yellow spots, depending on the location and habitat.

As it turns out this this spider is surprisingly common through much of Australia with its habitat being open forest, grassland and…. houses!

But fear not readers, whilst this spider is swift, running in short bursts and good at climbing walls and glass (including my bathroom mirror), they much prefer to hunt outdoors.

With its sudden movements and trembling front legs, the Swift Spider engages in "aggressive" mimicry; imitating its prey enables this spider to get amongst them undetected before ambushing and making its kill. This is how it gets its other name, the Bug-mimicking Spider.

Also, it sometimes walks on three pairs of legs, waving its front orange legs like antenna; said to be based on the mimicry of the Gum Tree Shield Bug nymph, which it predates on. Its stop-start erratic movements in different directions across the ground is also said to mimic the actions of wasps.

With a little assistance from google, I soon discovered that if this little critter was to bite me I wasn't going to die a long painful death, just some mild local pain, redness and swelling at the site. I then realised it was a long way from home and I safely re-located it to the nearest gum tree, where it could build a few new threads for its web and hunt again.

Arachnids are not my favourite animals but they play an important role in the food chain, particularly in the control of insects. By taking the time to find out something new I had a whole new respect for this creature that had mistakenly wandered into my bathroom.

So I ask you… try pushing past your fear and delve into the fascination to find out which invertebrates are hunting around your school or home?

Are your students keen to find out more about the world of spiders? The Australian Museum has some great resources to help you learn more about diversity, the life of the spider and their place in history, art and culture.

References:

- Swift Spiders, Sciencentre - Queensland Museum Network
- Orange legged swift spider, Arachne.org
- Swift Ground Spider, The Find-a-Spider Guide for the Spiders of Southern Queensland
- Bug mimicking swift spider, Brisbane Insects
- Suppuna picta, Bushcraftz

There is a significant size difference between the minor and major workers (Photo: Mario Muscedere & James Traniello)

A big head, but down-to-earth

The Big-headed Ant (*Pheidole* spp.) is not just one species, but thousands of closely-related species that make up nearly 10 per cent of all ants on earth. Members of this genus (the taxonomic category above species) have two distinct forms for their worker ants – a minor (small) worker, and major (big-headed) worker.

Ants live in complex social structures called colonies and specialise in tasks, depending on their body type. The Big-headed workers that give this genus of ants their name are sometimes referred to as soldiers, although they often use their large mandibles (jaws) to crush seeds rather than purely for fighting.

Ants are some of the most successful creatures on the planet, inhabiting most terrestrial environments and thriving in many areas with extreme conditions. They are important links in many food chains, as different species can be predator, prey, and decomposers. They also play an important part in ecosystems by aerating soil with their tunnelling, burying seeds to increase germination, and forming mutualistic relationships with plants and insects where both parties benefit. Ants are a fantastic way to introduce many scientific ideas to students, as they are readily available for study and offer rich opportunities for research and experimentation.

For more information on ants and how to include them in classroom learning, see the Native Ants Teacher Pack, and the Native Ants ID Chart.

Keywords and phrases: decomposers; adaptation; food webs; classification; living things live in different places; living things depend on each other; features of animals and plants; mutually beneficial relationship

References:

- http://bie.ala.org.au/species/urn:lsid:biodiversity.org.au:afd.taxon:63a0fda9-eaa3-47d8-8a15-3a50492a0651
- https://collections.museumvictoria.com.au/species/15124

During the day Giant Centipedes can be found hiding under rocks, bark and leaves (Photo: Rob Wallace)

Come on, keep up–many legs make light work!

Next year on May 18 it is 'National Walk Safely to School Day', where primary school children are encouraged to walk to school promoting health, road safety, public transport and the environment. A crawl-tastic arthropod who would love to take part in this event is the Giant Centipede, *Ethmostigmus rubripes*. As the name suggests, it the largest native centipede in Australia, growing over 16cm long and having between 42 and 46 legs. However, that's only about half the size of the Amazonian Giant Centipede (aka Peruvian Giant Yellow-leg Centipede). Arthropods are animals without backbones that have an exoskeleton (external skeleton), segmented bodies and paired, jointed appendages.

They include spiders, insects, centipedes, mites, ticks, lobsters, crabs, crayfish, barnacles and scorpions. Over 80% of all animals on the planet are arthropods. The first pair of legs on a centipede is located just behind the head and used as adapted claws (known as the 'forcipules') that are able to extend around the head to inject prey with a toxic dose of venom. The unlucky prey typically includes snails, insects and worms. Centipedes can bite humans if disturbed, which may cause severe pain that can last for several days. Giant Centipedes are native to Australia and are nocturnal. During the day they hide under rocks, bark and leaves but at night they come out to hunt. Living in both dry and wet habitats they are found throughout Australia. They are very beneficial for farmers because they also love to snack on harmful fungi and bacteria that can potentially infect plants and even cause sickness in humans.

To help protect centipedes and other arthropods try to reduce the amount of chemical sprays you use in your garden.

References:

- http://www.brighthub.com/environment/science-environmental/articles/85197.aspx
- https://australianmuseum.net.au/giant-centipede
- http://bie.ala.org.au/species/urn:lsid:biodiversity.org.au:afd.taxon:5d937df2-e9dc-43a1-b829-2087ca5529ff#classification
- https://en.wikipedia.org/wiki/Ethmostigmus_rubripes

Beetles have a modified pair of wings called elytra which act as a form of armour but make flying tricky (Photo: Steve Walker)

It's beginning to look a lot like Christmas... Beetle

Christmas Beetles are a group of about 36 species of large glossy brown and/or green scarab beetles found throughout Australia.

They are nocturnal and usually encountered when they're attracted to outdoor lights or open doors and windows. They are typically most active around dusk and, as a result, they are often seen as they crawl around or come crashing clumsily into lounge rooms and outdoor eating areas shortly after dusk.

Why are they such clumsy flyers? Being insects they have two pairs of wings but, as with other beetles, one pair has been hardened into protective plates called elytra. The elytra must be raised so that the wings can be unfolded, meaning they don't have the aerodynamics and extra strength that a second pair of wings gives to other flying insects.

The entire lifespan for Christmas Beetles is one to two years, depending on species, but the adults live for just a few weeks. The early part of their life is spent hidden away underground as larvae, feeding upon decaying vegetation and roots of native grasses. They will also feed upon agricultural crops, pasture and garden lawns if other food isn't readily available. In late winter or early spring the larvae move closer to the surface where they pupate for several weeks. Once rains soften the soil the adults burrow out from underground then remain active throughout summer feeding on Eucalyptus leaves and searching for a mate.

During the day you may be able to see clusters of Christmas Beetles, with the males trying to push each other off the females. Following mating the female lay eggs in the soil.

Female Dolly Wasp parasitising larval Light Brown Apple Moth (Photo: Dr M Yazdani)

Raise your glasses to the beneficial Dolly Wasp

Wasps' reputations as stinging insects to be avoided are being challenged as their role as beneficial insects becomes better known.

The tiny Dolly Wasp (*Dolichogenidea tasmanica*) is one such beneficial insect for anyone who likes a glass of wine. This wasp is a viticultural blessing, as it protects grapevines from damage by being a natural control for Light Brown Apple Moth, one of our main vineyard pests.

Light Brown Apple Moths feed on and cause damage to grapevine leaves, fruits and flower clusters , resulting in yield losses and damage to berry skins. Dolly Wasps parasitise the moths by laying a single egg inside their caterpillars. When the Dolly Wasp hatches it feeds upon the caterpillar's body and grows, eventually killing it. Dolly Wasps can lay eggs in many caterpillars during their lifetime.

We can actively encourage parasitic wasps by planting local native plants such as Christmas Bush, Bursaria spinosa, in and around our vineyards. Christmas Bush is a host plant for adult wasps, encouraging them to thrive, and enhancing their capacity to control vineyard pests.

To learn more about our amazing local native plants, refer to the Native Plants of the Adelaide Plains ID Chart with colour photos available to download from our website.

Acknowledgements:

- M Retallack
- Dr M Yazdani

The Dainty Swallowtail (Photo: Patrick Honan, Museums Victoria) and (inset) chrysalis (Photo: Jeremy Gramp)

If life gives you lemons, be a butterfly

The Dainty Swallowtail (*Papilio anactus*) is one of the most common Australian butterflies you're likely to see in the Adelaide region. This striking butterfly is easily recognised by its predominantly black and white colouring and slow, lazy flight during the warmer months. Also known as the Dingy Swallowtail or Small Citrus Butterfly, it has only been found in South Australia since the 1920s; when enough citrus was grown to support the dietary needs of their caterpillars. Prior to the arrival of commercial citrus trees, these caterpillars fed on Native Limes such as Finger and Desert Limes in the eastern states.

A locally native lookalike is the Chequered Swallowtail, which has very specific host plant requirements for its caterpillar, only feeding on species of Cullens, such as Native Scurf Pea (*Cullen australasicum*). As these plants have been cleared along with other native vegetation, the Chequered Swallowtails have declined with them. By restoring this native vegetation we can provide food for the caterpillars and help to increase their numbers.

In contrast, due to the prevalence of backyard citrus trees, the Dainty Swallowtail is common in urban areas, where it lays yellow to orange eggs on the underside of leaves. The caterpillar hatches after a few days, eats the remains of the egg as its first meal, and then feeds on citrus leaves until it is large enough to form a chrysalis. During this time it is quite vulnerable to predation, and has evolved a defence mechanism where, if threatened, it secretes an acid from a tentacle behind its head that smells strongly of rotting citrus.

The chrysalis also has a good evolutionary strategy for survival; camouflage. It looks remarkably similar to the stem of a citrus tree, so it is quite unusual to spot one. However, if you look carefully you might be lucky. For more information on the lifecycles of our butterflies, and how you can encourage them to breed and visit your school or home, see our Butterfly Garden Taking Action Module and Butterfly ID Chart.

References:

- http://www.backyardbuddies.org.au/backyard-buddies/dainty-swallowtail-butterflies
- http://www.climatewatch.org.au/species/insects/dainty-swallowtail-butterfly

A fishing spider using surface tension to walk on the water (Photo: Jeremy Gramp)

No web of intrigue for these spiders

Would you believe that at your local wetland or creek there are spiders that dive beneath the surface to catch fish, tadpoles and aquatic insects? Welcome to the world of the Fishing Spiders. With Thursday 22 March being World Water Day we thought it timely that we have a look at some of our lesser known creatures that are dependent on water as a habitat, the Fishing Spiders.

Fishing Spiders are not commonly seen, however they do live in water bodies throughout South Australia. In fact they are found on every continent except Antarctica. They live at the edges of ponds, lakes, marshes, streams and rivers, especially amongst the aquatic vegetation in still waters, but are less likely to occur in fast flowing waters.

Fishing Spiders are light in colour, usually brownish, and adults can grow to about 5 cm in length, including their legs. Their body is roughly the size of a 50 cent piece and they resemble Wolf Spiders, but with longer legs.

Most people are aware of the spiders that use a web to catch insects, with a spider sitting in the middle of a web and sensing the vibrations of captured prey. Fishing Spiders catch their food without using a web; however they use the water's surface in place of a web by anchoring their hind legs to the bank or a plant, then extending their front legs onto the surface to sense the ripples of an insect that might have landed in the water. They then use the surface tension to run across the water to reach their prey.

They can also dive beneath the surface to hunt tadpoles and fish; remaining underwater for more than 30 minutes by using the fine hairs on their abdomen to trap a bubble of air. Once they have caught their prey they sit on the bank or a rock to feed.

If you are interested in undertaking an investigation into the aquatic macroinvertebrates in your local area, we have a great variety of resources to assist you. Visit the macroinvertebrate section of our website to find out more.

Reference:

- EPA - Critter Catalogue A guide to the aquatic invertebrates of South Australian inland waters.

A male Common Brown Butterfly (Photo: John Tann, Wiki Commons)

Black and brown and gets around

We have regular conversations with schools interested in attracting butterflies to their gardens and with the warmer weather coming, now is the perfect time to start looking for them.

There are many species found in the Adelaide and Mount Lofty Ranges region, one of which is the Common Brown Butterfly (*Heteronympha merope*). You have probably seen this species before, as they live in urban areas as well as forests and woodlands, and are widely found across the Adelaide Hills Face Zone. Males and females have quite different markings, with males having black stripes all across their orange wings while females have a more solid orange wing with dark brown and black just around the edges. The females are larger, growing to 64 mm, while males only reach 56 mm long.

Males appear earlier in the year, around early spring, with females coming out to mate around November. The male butterfly dies shortly after mating, but the female rests throughout summer (also known as aestivation) before emerging again in March to lay her eggs.

If you are looking to attract these butterflies to your garden at school or at home, Thick Stem Tussock Grass and Kangaroo Grass are both host plants for the caterpillars. Brightly coloured native flowers such as Pigface and Native Lilac are also great to draw butterflies in. The butterflies will also need large flat rocks to rest and sun themselves on.

For more information on this and other species, see our butterfly ID chart. Also check out this online tool from Butterfly Conservation SA for finding butterfly attracting plants suited to your local area.

References:

- https://butterflyconservationsa.net.au/butterfly/common-brown/
- https://australianmuseum.net.au/common-brown-butterfly
- http://www.climatewatch.org.au/species/insects/common-brown-butterfly

The tiny dots in the jelly are the individual Moon Snail eggs (Photo: Jeremy Gramp, Inset: Tony Flaherty)

Acid tongued sausage blubber

In the spring and summer months it is very common to find sausage-shaped jellies scattered across our beaches. While they are often mistaken for jellyfish, these 'sausage blubbers' are actually the egg sacs of Moon Snails.

After the Moon Snail egg sac is laid it absorbs water and swells, reaching a length up to 25 cm and a diameter of 3.5 cm, depending on species, which may be five times the size of the snail that laid it. The egg sac breaks up after a few days, releasing planktonic larvae into the water.

Moon Snails are species of predatory molluscs which live in intertidal areas and mainly feed on bivalves such as cockles, clams and mussels, as well as crabs. To get at the soft flesh of their prey they grab hold of them with their muscular foot then drill through the shell with a radula - a rasping tongue covered in tiny teeth – assisted by acid. They can then eat the living prey through the hole.

If you go beachcombing, have a close look at any shell you find and you might see a hole indicating that it was attacked by a Moon Snail. If you find the jellies and think about tossing them at a friend or squishing them between your toes, remember they contain the unhatched babies of Moon Snails.

Key words and phrases: Lifecycles; Food webs; Predator and prey relationship; Effects of human activities; Features of animals and plants

References:

- A Beachcomber's guide to plants and animals in South Australia's Marine Parks
- https://www.australiangeographic.com.au/news/2011/08/speedy-snail-is-surprise-crab-killer/

Attendant ants protecting butterfly larvae on a golden wattle (Photo: Amy Blaylock)

Loyal ants protect vulnerable larvae

Golden Wattle (*Acacia pycnantha*) is a small native tree you commonly pass in Adelaide parks and gardens, but have you ever stopped to look more closely?

From the base of the tree to the tips of their modified leaves, there are amazing symbiotic relationships playing out. Ants feature in many of these relationships.

Two-spotted Line-blue and Icilius Hairstreak butterfly larvae eat the flower buds and young leaves respectively, while being protected from predators by small *Iridomyrmex* spp. ants. These attendant ants can be seen in constant activity shepherding the larvae around the plant.

Fiery Jewel butterflies are much rarer in Adelaide, and you will not see their larvae or attendant Papyrius ants during the day on a Golden Wattle because they are being protected by the ants in a special type of nest called a byre at the base of the plant. During the night the larvae eat the wattle leaves and produce a type of nectar from the end of their body which the ants feed on.

If you would like to identify the ants you have at your site or explore learning activities, use the Native ants of the Adelaide and Mount Lofty Ranges region identification key and chart **and the** teacher information pack**.**

Key words and phrases: Lifecycles; Food webs; Living things depend on each other; Mutually beneficial relationship

References:

- https://sabutterflies.org.au/home/index.html
- http://www.flora.sa.gov.au/cgi-bin/texhtml.cgi?form=speciesfacts&family=&genus=Acacia&species=pycnantha&iname=&submit=Search
- http://www.antwiki.org/wiki/Iridomyrmex

Scallop with red sponge epifauna in Gulf St Vincent (Photo: David Muirhead)

The eyes have it!

You may have seen pristine scallop shells on the beach and thought there was nothing much inside of them. But before they were washed up on the beach, the shells contained living, breathing animals which actually swim around underwater, gaining momentum by rapidly beating their two hinged shells together. In fact, the white flesh that many people enjoy eating is the muscle that opens and closes the shell. Interestingly, many scallop shells are also protected by a symbiotic sponge which grows over the shell, making it difficult for predators like sea stars grab the scallop.

The hinged shells on a scallop, comprised of calcium carbonate, are what make them part of the class of molluscs called bivalves. Other creatures in this group include clams, mussels and oysters. However, scallops have several unique characteristics that set them apart from these other species; including their aforementioned swimming ability, as well as their comparatively sophisticated vision. As you can see in the photo, they usually have between 50 and 100 pairs of eyes along the mantle (the outer wall of their body. Unlike mammals, scallops focus light by adjusting the retina (the inner membrane of the eye) not the external cornea.

There are around 350 species of scallops found around the world, both in freshwater and saltwater environments. Only a handful of these are currently known to exist in Australian waters, three of which are widely trawled and used in cooking (Commercial Scallop, Northern Saucer Scallop and Ballot's Saucer Scallop). Their numbers are high enough that overfishing is not a major risk to their population at this point; however one of the biggest threats to scallops (and to bivalve species in general) is the acidification of our oceans. When this occurs, it makes it more difficult for calcium carbonate (alkaline) shells to develop and therefore numbers are in decline in areas where ocean acidification is high.

Reference:

- https://www.thoughtco.com/facts-about-scallops-2291857
- https://www.sydneyfishmarket.com.au/seafood-school/seafood-info/species-info/species-details?specieid=207&specieDescriptionID=207#.XHNcXNLr3nM
- https://sciencetrends.com/what-exactly-are-scallops/

Sponges wash up on the shore in all sorts of shapes and sizes (Photo: Camille Jenkinson)

As simple as a sponge

Imagine a life as simple as a sponge's. Sponges do not have a mouth, muscles, heart or brain. Instead, a sponge consists of two main layers of cells, surrounding a non-living jelly like mass. Sponges have many pores and channels that they use to pump water through their body. Most sponges are filter feeders, meaning they extract their food from water that they pump though their pores before expelling the waste through larger holes called osculae.

Sponges have sure been around for a while; the oldest fossil sponges have been dated at 580 million years. They were one of the first phylums to branch off from the evolutionary tree and are part of the animal kingdom which includes us.

While a sponge may be a simple old soul, they have a few special talents. For one, a living sponge can change the shape of its body, taking on shapes such as wine glasses, fingers, balls, or flat, spiky mats. This is because the cells in their body can move around. Some cells can even change from one type of cell to another.

With May 4 as Play Outside Day, why not consider the beach as a place to play and explore? What shapes of sponges can you find?

To dip your toes into more underwater or coastal explorations, check out the Beachcombers Guide to Plants and Animals or the Snorkelers Guide to Plants and Animals.

References:

- https://en.wikipedia.org/wiki/Sponge

A beach washed shell of the razorfish Pinna bicolor (Photo: Jeremy Gramp)

On a razor's edge

With a name like razorfish, you'd be forgiven for thinking that the animal in question is a type of fish. Despite the name, razorfish are actually bivalve molluscs, related to clams and oysters.

'Bi' means two, while 'valve' is the proper term for what most people commonly call the shell. The two shells are essentially symmetrical and attached via a hinge.

Most razorfish occur in the tropics or subtropics, with only two species being found in Gulf St Vincent; *Pinna bicolor* and *Atrina tasmanica*. Of the two, you are more likely to come across *Pinna* because it is far more common. It is the largest bivalve found on the south coast of Australia, growing to approximately 50 cm in length.

Razorfish are fan-shaped, with the pointy end embedded in the sand or mud and the razor sharp tops of their shells protruding above the sediment. If you step on them with bare feet there is a risk of getting cut - hence the 'razor' part of their name. They are found from the low tide mark in calmer waters to a depth of 20 metres off wave exposed beaches.

The outside of their shells act like mini reefs because they are colonised by a large variety of other animals and plants (epifauna and epiflora). Razorfish live for a surprisingly long time, with Pinna having been recorded living for up to 18 years. Even after death the razorfish shells often remain in place in the sand, continuing to provide substrate for the epifauna and epiflora. After the razorfish dies, the inside of the shell can be used by animals such as the Blue-ringed Octopus.

Have you ever found a razorfish shell washed up on the beach? In most instances you are only going to find one of the shells, its 'other half' long since separated.

Check out our new beachcombing ID chart to see what other plants and animals you can find on your next beach walk.

The Short-tailed Ceratosoma comes in a spectacular range of colours (Photo: © Rebecca Lloyd)

Extraordinary ocean 'back breathers'

Our local marine environments contain a wonderful diversity of aquatic life, more so than the Great Barrier Reef. This includes thousands of invertebrate species, with more being discovered every year. In particular, members of the family of opistobranchs, commonly known as sea slugs which are nothing like your backyard garden slugs. They come in a fascinating array of shapes, sizes and with unusual anatomical features. For example, nudibranchs like the Short-tailed Ceratosoma (*Ceratosoma brevicaudatum*) are adored for their extraordinary colours and forms.

Nudibranchs are soft-bodied, marine gastropod molluscs which live in the intertidal to deeper waters of the ocean. Many species are found locally, but the Short-tailed Ceratosoma is the most commonly sighted sea slug in South Australia. It grows up to 15 cm long and breathes through strangely shaped gill structures visible as branchial clusters on its back. Nudibranchs feed on sponges and can also touch, taste and smell through cephalic (head) tentacles. Each animal contains both male and female reproductive organs and will lay transparent spiral strings of eggs, which contain toxins to deter predators. The next time you hit the beach and go snorkelling 'branch' out and keep an eye open for these incredible critters.

These unique animals rely on healthy habitats for their survival, but pollution and loss of habitat are some of the biggest threats they face. We all need to take responsibility for looking after our coastal and marine environments, so visit the Coastal and Marine Environments page on our website to find resources on how students can learn more about these areas and how they can take action to help protect them.

References:

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- https://bie.ala.org.au/species/urn:lsid:biodiversity.org.au:afd.taxon:c361aa5a-a4e3-4760-8f98-1e59f800ff6b
- A Snorkeler's guide to plants and animals in South Australia's Marine Parks

Despite the name, Purple Sea Urchins come in a variety of colours (Photo: Steve Walker)

Spiky delicacy

The Purple Sea Urchin, *Heliocidaris erythrogramma*, is a spiky creature with tube feet and a mouth on the underside of its body. It can grow up to 14 cm in diameter and despite its common name, individuals vary widely in colour; they can white, green, purple or black. The urchin can be found in waters up to 35 metres deep but it prefers water 10 metres deep.

Sea urchins are benthic animals, which means they are found on the bottom of the ocean, usually attached to rocky reefs, crevices, seagrass beds, stones and sandy mud. They are herbivores and feed by grazing on rock surfaces, and trapping algae and seagrasses. To protect themselves from predators they often live in clusters and use their sharp spines to burrow into rock crevices. They also cover their body with shells and sand as camouflage.

The sea urchin is also a prized delicacy in China, Japan and other countries. There is a growing market for commercial fishing of the Purple Sea Urchin in Australia. Only the orange reproductive organs are eaten, raw or cooked. They taste a bit like oysters and are also considered aphrodisiacs.

Key words: Features of animals and plants; predator and prey relationship; camouflage.

References:

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A Green and Gold Nomia Bee pollinating a Black-anther Flax-lily (Photo: Jeremy Gramp)

Mulch ado about nothing

During spring and summer many people scramble to mulch all bare soil in an attempt to reduce evaporation, but there are good reasons to leave some areas exposed. Australia hosts thousands of species of native bees and it has been estimated that around 70% of them create burrows in the ground. Locally, the famous Blue-Banded Bee (*Amegilla murrayensis*) relies on exposed clay soils to build nests, but will also use bee hotels made by packing clay into a container.

Another local species that uses soil for nesting is the Green and Gold Nomia Bee (*Nomia australica*), which can easily be mistaken for a European Honey Bee (*Apis mellifera*). However, Nomia bees have a completely different lifestyle; instead of creating large colonies of thousands of individuals, just one to three females will share a single burrow entrance and lay their eggs in personal tunnels that branch off the main shaft. Unlike Blue-Banded Bees, their nests need to be much deeper, so they are less likely to use artificial bee hotels.

To avoid the nest being flooded by rain, ground-dwelling native bees often prefer sloping or near vertical surfaces in which to dig their burrows. Alternatively, some species choose well-draining lighter soils, as can be seen in this video showing an *Amegilla* species of bee in Western Australia.

Of course, bees are not the only animals that rely on soil; many native ants are also highly dependent on soil for habitat. Consider using World Soil Day on 5 December to explore some of the ways animals use soil, and remember to leave some patches exposed and undisturbed for our important native invertebrates.

Keywords: Adaptation; Lifecycles; Living things live in different places; Effects of human activities; Features of animals and plants

References:

- https://australianmuseum.net.au/learn/animals/insects/nomia-bees/
- https://www.aussiebee.com.au/bee-hotel-introduction.html

This Black Rock Scorpion was found cruising around an Adelaide Hills bathroom (Photo: Steve Walker)

Not such a sting in the tail

The Black Rock Scorpion (*Urodacus manicatus*), as its name suggests, can be found in shallow burrows under rocks in open forests, woodlands and mountainous regions along the east coast of Australia from Queensland through to South Australia.

The Black Rock Scorpion is an ambush predator, waiting at the burrow entrance to surprise passing prey, which may include cockroaches, beetles, millipedes, centipedes and other small creatures. It is able to detect the vibrations of prey moving along on the ground, allowing it to stay safely hidden under the rocks until it attacks its prey.

Scorpions have some fascinating traits. They are fluorescent under ultraviolet light, which makes it easy for scientists to find them in the field. A female gives birth to live, white-coloured young, and carries them on her back for several weeks. After the first exoskeleton shed, the young wander off on their own to find their own food and rock to burrow under.

Scorpions don't necessarily have the best reputation; in many parts of the world including North Africa, Central America and the Middle East, they are lethal and are responsible for many deaths each year. But in Australia we are quite lucky; Black Rock Scorpions rarely sting, unless stepped on, and typically only cause localised pain, slight swelling and a rash.

If a Black Rock Scorpion does find its way inside your house, you can gently coax it in to a glass or other container to relocate it to your backyard or local reserve.

References:

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- https://www.abc.net.au/news/2018-04-14/scorpions-are-beneficial-no-need-to-fear-them-in-australia/9640322

A dung beetle rolling a ball of dung (Photo: CSIRO)

Don't poo poo the dung beetle!

When humans go to the toilet, the waste is transported through pipes to a treatment plant where solid waste can be removed and used for farming, with the cleaned liquid being released out to the ocean or used in forestry and agriculture. Have you ever wondered what happens to all the poo created by our native wildlife and livestock? That's where the helpful dung beetles (family Scarabaeidae) come in, helping out as part of nature's composting system.

Dung beetles have hard outer bodies and six legs which they can easily use to shovel dung and earth, making them important in the ecosystem as great soil aerators and for waste treatment. Australia has more than 500 native species of dung beetle but others have also been deliberately introduced into Australia's agricultural areas from other countries to deal with the wasted generated by cows and other livestock.

Before breeding, adult dung beetles bury dung under the earth for their larvae to eat once they've hatched from eggs. This is especially beneficial for plants because the dung contains many vital nutrients.

Sunday 1 March is Clean up Australia Day and Tuesday 3 March is World Wildlife Day, so why not research to find other local native animals that help to "clean up" Australia? Compare and contrast the roles these animals have in the ecosystem. For example, you could check out our Ants Teacher Information Pack to compare ant decomposers with the dung beetles.

You could also work with your students to further understand how these small bugs fit in to the bigger ecosystem by investigating various natural aspects mentioned in our Terrestrial Habitat Teacher Information Pack.

References:

- Australian Museum
- Benefits of using dung beetles

The bright red head and jaws of the male Red-headed Mouse Spider, sighted in Cherryville (Photo Rob Wallace)

Big fangs but quite mousy

Australian arachnids can look quite scary, yet cause far less injuries to humans than the European Honey Bee. The locally native Red-headed Mouse Spider (*Missulena occatoria*) is no exception, as the males have a bright red head and jaws, and can deliver a venomous bite similar in toxicity to Funnel Web Spiders. Despite this toxicity, cases of people being bitten are very rare, as the spider is not aggressive.

Female mouse spiders look very different to males, as they tend to be brown or black all over, and are much larger; around 35 mm compared to 15 mm for the male – a good example of sexual dimorphism, where sexes can look very different from each other. In fact, for many years scientists thought they were two separate species.

It's also much more common to see males than females, as they are one of the few spiders that wanders over open ground during the day; searching for females who are much more likely to stay put in burrows up to 30 cm deep. Late summer and early winter are the most common time to see these spiders, especially after rain.

After mating, baby spiders called spiderlings can be seen 'ballooning'; climbing to a high point and releasing fine strands of silk that catch the wind. Using this technique spiderlings can travel anything from metres to kilometres, with one amazing example from Charles Darwin's Beagle voyage, where spiders landed on the ship rigging 100 km from any coastline.

References:

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- https://www.australiangeographic.com.au/topics/wildlife/2012/08/australian-spiders-the-10-most-dangerous/
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An adult Green Planthopper on a Broad Bean plant (Photo: Jeremy Gramp)

The secrete life of planthoppers

Have you ever had a really close look at the plants in your yard? You might be surprised at the amazing variety of invertebrates that can be found living on, in and around them. Some of these animals are so well camouflaged that you are very likely to miss spotting them unless you look carefully.

One such creature that is common in the Adelaide area is the Green Planthopper. As you can see from the photo the adult looks remarkably like a small leaf, due to its triangular wings.

Green Planthoppers are native to Australia, being found in all states and territories, but they have also been unintentionally introduced to other parts of the world, including New Zealand, South Africa and the USA.

The 'hopper' part of its name comes from the fact that it can jump extremely quickly. In fact, for that very reason it is sometimes referred to as a Torpedo Bug.

Green Planthoppers are usually quite small, 8-10 mm long, but can grow as large as 15 mm. They are sap-sucking insects, feeding on the leaves and trunks of plants. Like other sap-sucking insects, such as aphids and mealybugs, they produce and secrete a waste product called honeydew, the colour of which is influenced by the type of plant that they have been feeding on.

While the Green Planthopper is the best known of our native planthoppers, there are many other related planthoppers that you might be able to find in your garden. So, before the weather gets too cold, head outside and have a look to see what invertebrates you can find in your local environment.

Sometimes the most productive spotting is done at night time; not only are more of them active then but the concentrated beam of a torch light may make it easier to focus on them.

Praying mantid on a backyard shrub (Photo: Amy Blaylock)

Praying mantids

Australia is home to over 100 species of praying mantids. Most live in the tropics, but a handful of species are found in South Australia.

Your backyard or local park might be where you spot one if you are very observant, because they usually look like leaves or sticks so that they themselves are not eaten. These highly camouflaged carnivores with powerful chewing mouthparts can grow up to 120mm long. They share some features with aquatic macroinvertebrate ambush predators like water scorpions and needle bugs, waiting for prey to come towards them then grabbing them with their grasping first pair of legs.

You can encourage praying mantids in your garden by providing habitat that includes tall grasses, flowers, shrubs and trees which will also attract lots of insect prey. Make sure you limit or eliminate the use of pesticides. Use some local native plants where you can, because they will also provide shelter and food for other local species like reptiles and birds.

Gardeners usually consider praying mantids to be beneficial insects because they can keep in check unwanted insects like aphids, grasshoppers, caterpillars and bugs that attack their plants, but they will also occasionally eat bees and butterflies as well.

Key words and phrases: Food webs; Features of animals and plants; Plants provide shelter; Predator and prey relationship; Camouflage.

Maintaining and enhancing fauna and flora in the urban environment is one of seven key priorities of Green Adelaide.

References:

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Common Hover Fly feeding off a daisy. Inset: A rat-tailed maggot. (Photos: Steve Walker)

A crafty little hoverer

In your garden you may have noticed small to medium-sized insects flying around your flowers in a manner suggestive of a traffic helicopter – hovering intently over one spot and then quickly flicking off before hovering again. Whilst these insects tend to be brightly coloured and resemble bees or wasps, they are in fact hover flies and more closely related to house flies and mosquitos than bees.

However, this shouldn't put you off because they are a very important part of our environment and they do much more good than harm. Adult hover flies typically feed on pollen and nectar. As a result, they help to pollinate many native flowers. Perhaps more importantly, their larvae tend to be predators, feeding voraciously on aphids and other sap-sucking insects. These little flat-bodied maggots help to keep pest species in check.

Interestingly, some species of hover fly have aquatic larvae. These maggots, which live in stagnant water or muddy pools, have a long breathing tube (snorkel) which gives rise to their common name 'rat-tailed maggot'.

Hover flies are generally coloured yellow and black using a form of mimicry called Batesian mimicry, whereby harmless species mimic the warning markings or behaviours of harmful species (such as bees and wasps) to avoid being eaten. Some hoverflies will even mimic the stinging motion if caught and held. As they do not actually have a sting, they are quite harmless. Some species have a narrow waist, further mimicking the shape of wasps.

Around Adelaide the most frequently encountered hover fly is the aptly named Common Hover Fly (*Melangyna viridiceps*). This species has a relatively slim body, large head, short antennae and large reddish-brown eyes. The body is covered in fine yellow-brown hairs.

References:

- Zbrowski, P & Storey, R 2003, A Field Guide to Insects in Australia, 2nd edn, Reed Books, Sydney

Fishes

Male Leafy Seadragon with eggs attached to his tail (Photo: Jeremy Gramp).

Male mothers, wrinkly tails and egg cups

The vast majority of the marine creatures that live along southern Australia's coastline are found nowhere else in the world. As such we all have a responsibility to ensure their continued survival.

One of the most iconic creatures from this unique south region is the Leafy Seadragon, which in 2000 was declared South Australia's marine emblem.

Leafy Seadragons are masters of camouflage, resembling swaying seaweed. They inhabit rocky reefs, seaweed beds, seagrass meadows and structures colonised by seaweed.

One of their most interesting features is that at breeding time the male develops small pits or 'egg cups' on his tail. Eggs are transferred from the female into these egg cups and fertilised. For the next 8 weeks the male swims around carrying the fertilised eggs. In some cases algae grows over the eggs, which is thought to help hide them from predators. The young seadragons hatch over several days and at birth are about 20mm long.

Leafy Seadragons are a great tourism drawcard, with divers from all over the world coming here to experience diving with a 'leafy'. The seadragons that live near shore are highly susceptible to land-based pollution such as that found in stormwater runoff. Therefore we all have a role to reduce the amount of pollutants that enter the stormwater system and subsequently find their way out to sea.

Australians are not generally aware of the immense marine biodiversity that we have off the southern coast. As with land-based national parks, marine parks play a significant role in protecting our precious and unique local species like the Leafy Seadragon.

The NRM Education Loan Library has a great array of educational resources focusing on local coast and marine issues, including 'The Amazing Adventures of Gavin the Leafy Seadragon'. These resources are available for loan free of charge and can be accessed here.

Adult Common Galaxias from Christie Creek (Photo: Jeremy Gramp).

A small fish feeding a lot of people

This Friday 9 August is the International Day of the World's Indigenous Peoples. You may not know it but we have in our local waterways a fish that bonds a significant number of indigenous peoples throughout the southern hemisphere.

That fish, the Common Galaxias, has the world's largest natural distribution for a freshwater fish species. It is found in streams and rivers throughout Australia, in New Zealand and the southern part of South America, including Chile and Argentina. Indigenous people in all of these countries have traditionally used the juvenile form of the Common Galaxias as a source of food.

Common Galaxias have a very interesting diadromous life cycle, with the juveniles commonly known as whitebait. Diadromous refers to the fact that they migrate between the sea and freshwater to complete their development.

In Autumn, at the time of a full or new moon when the tides are high, the adult fish lay eggs amongst the vegetation of the flooded stream bank or estuary. For the next two to four weeks the eggs develop while being exposed to the air. At the next new or full moon tide, the eggs hatch and are swept out to sea.

Whitebait live in the ocean for six months, before migrating back to shore and swimming up the rivers. They measure just 30mm long at this stage. Even though they are small, it is mind boggling to think about the number of these fish that used to enter the rivers. European settlers caught on very early to this phenomenon and commercial fisheries started up. There is one record from a river in New Zealand so small you could walk across it. A a fisherman caught 2000kg of whitebait in one day, or 4 million individual fish! The commercial fishery in Australia ceased in the 1970s. These fish can still be found in our local waterways however, due to numerous reasons, they are not found in the numbers previously recorded.

Visit www.naturalresources.sa.gov.au/adelaidemtloftyranges/about-us/our-regions-progress/monitoring-and-evaluation/water to find out how Natural Resources staff are working to improve the condition of the Onkaparinga, Torrens and South Para rivers where these fish live in the region.

King George Whiting (Photo: http://jusfishin.wordpress.com/tag/reels/)

The king of Australian fish

Wednesday 21 November 2013 is World Fisheries Day, where fishing communities worldwide celebrate to highlight the importance of maintaining the world's fisheries.

Fish forms an important part of the diets of people around the world, particularly those that live near rivers, coasts and other water bodies. A number of traditional societies and communities are rallied around the occupation of fishing.

In South Australia our most famous 'food fish' is the King George Whiting. It is highly sought after by recreational and commercial fishers and has a reputation throughout Australia as being one of the best eating fishes, due to its delicate flavour and texture. Its popularity is enhanced by the fact that it retains its flavour after being frozen.

The King George Whiting is the largest of all the whiting species, growing to a maximum of 72 cm in length. It is easily distinguishable due to its size and the distinct bronze or brown spots on the back and upper side of its silvery body.

They are unique to Australia, being found along the southern coast from Jurien Bay in Western Australia to New South Wales. Their name actually comes from the location in which the first specimen to be described by a European scientist was caught, King George Sound in Western Australia.

There is a distinct difference in the habitat that the juveniles and adults occupy; juveniles live in seagrass beds in shallow sheltered areas, moving to greater depths when they reach about 10cm in length, whereas adults are found on weedy or sandy bottoms to a depth of about 25m.

They are a bottom feeder, sucking up their prey from just above or in the ocean floor. They eat a variety of marine invertebrates, including marine worms and crustaceans, particularly shrimps.

Due to their popularity with fishers, the recreational fishery is regulated through size limits, bag and boat limits, while aquatic reserves have been established to protect critical nursery areas of the King George Whiting.

Congolli (Photo: Jeremy Gramp).

Bridging the gap for Congolli

This Friday 21 November is World Fisheries Day, when fishing communities worldwide celebrate the importance of maintaining the world's fisheries. One local fish species that is relatively widespread in South Australia is the Congolli and a commercial Congolli fishery historically existed in the Lower Lakes and Coorong, where spawning females were netted.

It is found in freshwater streams that have coastal access, in estuaries stretching along the coast, and in marine environments. The Adelaide and Mt Lofty Ranges is one of the key areas where the species is found in SA.

Congolli are small to medium sized fish, reaching a maximum size of 35cm. However sizes of 10-20cm are more common. They are highly variable in colour, distinguished by a pointed snout and eyes near the top of their head. They are an ambush predator, often burying themselves in the sand or mud on the bottom, waiting for prey to swim past. They are mostly carnivorous, feeding on a variety of crustaceans, insects, molluscs, fish, worms and also aquatic vegetation.

The ability of the species to migrate between riverine and marine environments is critical for spawning to occur, however the construction of dams and weirs has impeded this process in many locations throughout SA. An example of this is the River Torrens where the five major weirs have significantly impeded fish movement, particularly the River Torrens outlet weir which resulted in Congolli disappearing from the River Torrens.

However, in 2005 the Adelaide and Mount Lofty Ranges Natural Resources Management Board installed a fish ladder at the weir which has allowed Congolli and other fish species access through the barrier, restoring Congolli populations in the lower River Torrens. Additional fish ladders were also constructed on weirs between Tapleys Hill and Henley Beach Roads in 2013.

Find out how you can get involved in monitoring our local fish species through our Engaging with Nature program.

Western Blue Groper (Photo: Peter Southwood, Wikicommons)

Protect fish with your face wash

Imagine a fish found in South Australia's coastal waters that is as long as the average adult is tall, can live almost as long as a human, and is bright blue. It's not just fantasy, because the Western Blue Groper is all of these and more.

Living for up to 70 years, these amazing fish are the largest bony fish species found on the rocky reefs of our state. All Western Blue Gropers are born female, and when they are around 35 years old, some of them turn into males. They live in small groups, usually with one male who is blue, several females who are a greener shade of blue, and some babies. Very strong teeth allow gropers to eat crabs, sea urchins and molluscs, so they play an important role in balancing reef ecosystems by controlling the numbers of these smaller creatures that eat algae growing on the reef.

If you are a diver, these fish are inquisitive and might swim right up to you, but this also makes it easy for spear fishers to kill them. Overfishing is a big threat for Western Blue Gropers because it takes them so long to become mature enough to breed. In many near-shore areas of South Australia you are not allowed to catch them, but some people ignore this rule.

Marine pollution is also another big threat because it can kill the creatures that the Western Blue Groper eats.

"Healthy oceans, healthy planet" is the theme for World Oceans Day this year - June 8 - and you can help to protect Western Blue Gropers and other marine animals by choosing your face wash carefully. These products can contain microbeads of plastic, used for their exfoliating properties, which are too small to be removed by wastewater treatment systems and end up in our oceans. They can absorb and concentrate toxic chemicals, and being a similar size to fish eggs can threaten the food chain.

Eastern Gambusia (Photo: Hunter Desportes)

Mosquitofish they're not!

Scooping around in a local waterway, you might think you've caught skinny tadpoles with big eyes, but there's a good chance you've got yourself some juvenile fish. One of these, the Eastern Gambusia, *Gambusia holbrooki*, is a little fish that grows up to create big problems.

They were introduced to Australia from the US in the 1920s to help control mosquitoes, but they have not lived up to their reputation as a 'mosquitofish' any better than our beautiful native fish.

Tolerating warm, salty and polluted waterways, breeding rapidly, and outcompeting and injuring native species, have all contributed to their dominance in some streams, despite females only reaching 6 cm in length and fully grown males measuring a tiny 3.5 cm.

While it might be tempting to keep some in a bucket or pond out the back, moving these little pests around can lead to their introduction into new waterways. They are a threat to local fish species not just in South Australia but also in other countries where they have been translocated.

The Eastern Gambusia is categorised as a 'noxious' fish under the Fisheries Management Act (SA) 2007, meaning you can't have them or trade them in this state without specific authorisation.

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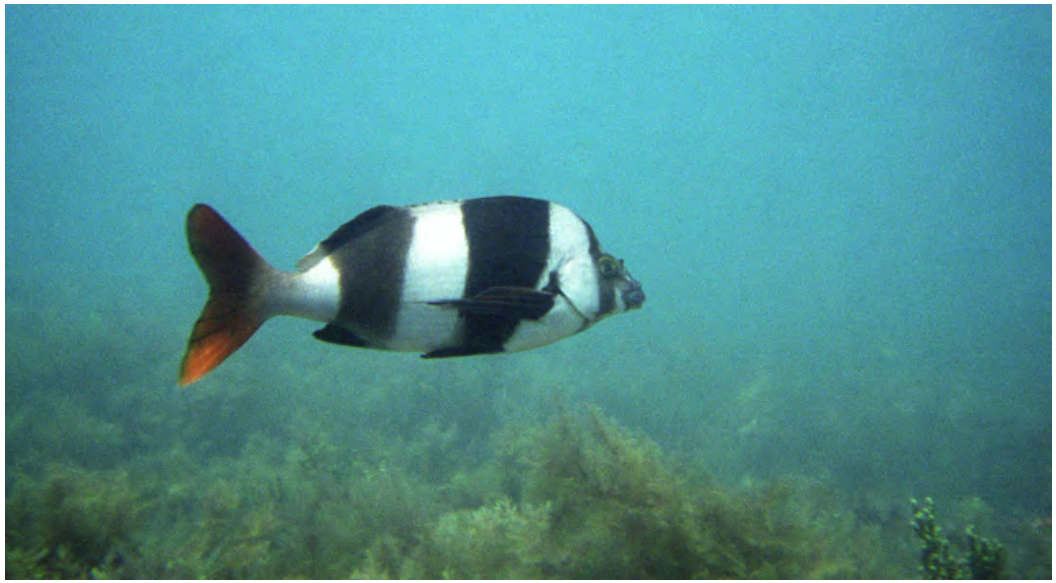
- PIRSA



The Magpie Perch is not actually a Perch (Photo: Jeremy Gramp)

Its name is morwong than right!

If you are lucky enough to get out in the water and go snorkelling off our coast, one of the fish that you are likely to see is the Magpie Perch, as it is one of the more common reef fish that can be found along the southern coast of Australia.

Despite its name, it has nothing to do with either magpies (apart from the obvious colour connection) or true Perches. It actually belongs to a group of fish called the Morwongs.

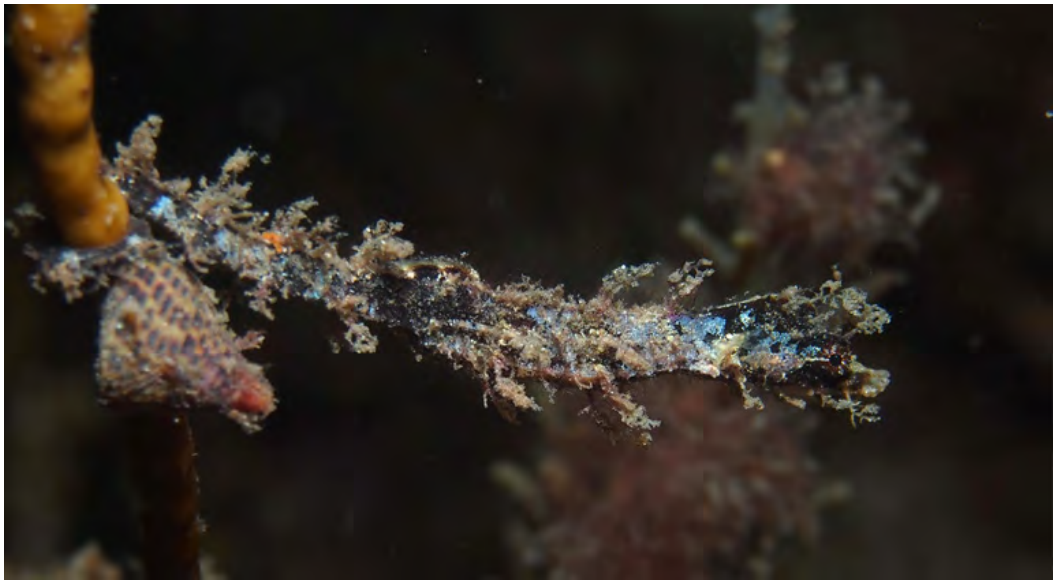
Magpie Perch are very distinctive and therefore easily identified, having two broad dark stripes on their body and a smaller stripe across the face. Interestingly the fish is capable of rapidly changing colours, whereby the middle dark stripe becomes an almost white/grey colour and the usual white spaces between the bands darken. Juveniles have a reddish coloured tail that darkens as the animals get older.

Adult Magpie Perch don't seem to be too bothered by the presence of a diver or snorkeler nearby, which provides a great opportunity to float alongside and observe them. Watching them feed is a particular highlight. They eat small invertebrates that are found amongst the sediment on the bottom or on top of rocks. This is achieved by sucking up mouthfuls of the sediment, extracting the food and then expelling the sediment, forming plumes of sand either side of their body.

Anyone can have a go at snorkelling. For the beginner, the reefs off Port Noarlunga and Aldinga are great places to get started, with now being the perfect time of year whilst the water is still nice and warm.

In our southern Australian coastal waters there are well over 10,000 species of plants and animals, and most are found nowhere else in the world.

To learn about some of the more common species that you can discover in our waters download a copy of the Snorkeler's guide to plants and animals in South Australia's Marine Parks.



A Southern Pygmy Pipehorse at Edithburg Jetty, South Australia (Photo: Simon Cribbes / Atlas of Living Australia. License: CC By Attribution)

Can you see it?

November 6 is the United Nations International Day for Preventing the Exploitation of the Environment in War and Armed Conflict, so what better day to learn about a creature so good at camouflage that we barely know anything about it? Every Southern Pygmy Pipehorse, *Idiotropiscis austral*, looks different; each having colouration matching its local algal environment.

They have been found living in temperate waters of southern and southwestern Australia in rocky reefs up to 30 metres deep, camouflaging themselves amongst algae and seagrasses. Growing to a length of just 5.5cm, its head can be covered with fleshy flaps and strands, and its tail covered with sporadic ridges.

The feeding habits of this species are unknown but it's likely they feed on small crustaceans. After breeding, the males are the main carer of the eggs, carrying them in a brood pouch. Two males were each found brooding 10 - 80 eggs.

Why not help researchers gather information by getting involved in marine monitoring? You can access more information on the Natural Resources Adelaide and Mount Lofty Ranges website.

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Keywords: Camouflage, Living things live in different places, Adaptation, Plants provide shelter, Features of animals and plants, Living things depend on each other.

Great white shark at Isla Guadalupe, Mexico (Photo: Terry Goss)

Great White Shark - threat or victim?

With an average length of 4.5 metres and weighing 2250 kg, the Great White Shark is one of the world's largest predatory fish. Although they have gained a reputation for posing a risk to humans, on average only three people in Australia die each year from shark attacks. Young Great Whites hunt smaller prey such as sea otters, rays and fish, while older sharks tend to hunt larger prey like sea lions, seals, small whales, other sharks and sea birds. Humans aren't on their menu. Despite having earned a reputation for mistaking humans for their prey, this is actually a myth. Great Whites are very sharp sighted and incredibly inquisitive creatures; they have been known to travel up to 21 metres to the surface to investigate debris no bigger than the palm of your hand. They use their 300 serrated teeth like humans use their hands. They will bite something unfamiliar to them, be it a person or floating buoy, looking for tactile evidence about what it is. In a living shark, every tooth has 10-15 degrees of flex and when they open their mouth the tooth-bed is pulled back causing the teeth to splay out. This flex, enables them to gather more information about the object, much like whiskers in a cat. If curiosity gets the better of a Great White and they do happen to bite a human, they often spit them out, because we are just too bony. A Great White's slow digestion makes eating humans less than optimal because bones further slow digestion, preventing them from eating the high fat prey required to maintain their brain and body temperature in cold water. This is why the seal is a favourite food; the insulation that keeps seals warm is pure fat. Humans are arguably a greater threat to sharks than they are to us. Sharks are hunted for sport, finned to make shark-fin soup and used for other products, including shark-tooth medallions. They also often get caught up in commercial fishing nets.Fear of sharks means shark nets and drum-bait lines are deliberately set off the coast along popular beaches around Australia to keep shark numbers down at beaches. As an apex predator, the Great White is important in maintaining balance within the marine ecosystem. Removing apex predators gives rise to "meso-predator" populations which we now know can lead to declining prey populations. This drives local extinctions and has economic impacts, including the collapse of fisheries and the death of coral reefs. So, the Great White should not be feared for the taking human life, but rather respected for giving life.

For an interesting case study on returning an apex predators to an ecosystem, check out the return of the wolves to Yellow-Stone National Park, How Wolves Change Rivers.

Seahorses use their prehensile tails to cling to leaves, algal fronds, sponges and other structures (Photo: Steve Walker)

Tiny horses of the sea

Did you know that seahorses are types of fish? They are part of a large and diverse family, which includes pipefishes, seadragons and pipehorses. Two species of seahorse have been recorded in South Australian waters, the Bigbelly/Potbelly Seahorse and the Short-snout Seahorse. There is also the possibility that a pygmy species occurs in deeper waters.

Seahorses are masters of camouflage and live in seagrass meadows, sponge gardens, coral and rocky reefs and mangrove areas. Like all members of the family Syngnathidae, they have a tiny mouth at the end of a tubular snout which they use to suck in their diet of tiny crustaceans. They are also are well known for their unique reproductive system, where the female deposits eggs into the male's abdominal pouch. He then incubates and nourishes the developing embryos until they hatch.

Unlike its namesake, the seahorse is one of the slowest swimmers in the ocean. They swim upright using their dorsal and pectoral fins for propulsion, but much prefer to use their prehensile tails to cling to leaves, algal fronds, sponges and other structures. Here they are well hidden from predators and can snatch their dinner as it swims past.

Over the last 60 years marine habitats such as seagrass meadows and reefs have been declining across the Adelaide metropolitan coastline; key habitats for our seahorses. The health of our seas and coastlines are affected by the things we do on land in the catchment. Land-based impacts to marine habitats include litter, excess nutrients and sediments from stormwater and wastewater. If you're interested in exploring catchments with your students and learning about how you can minimise your impact on our marine environments, you might like to download our resources, Best of Catchment Connections and Catchment Education Teacher Information Pack.

For further information on how you can help protect our coasts, please visit the Natural Resources Adelaide and Mount Lofty Ranges Coastal and Marine Ecosystems webpage.

Keywords: Camouflage; Marine habitats; Adaptation; Classification; Living things live in different places; Features of animals and plants; Catchments; Human impacts.

The Port Jackson Shark (Photo: Richard Ling) and (inset) egg case (Photo: Mark Norman / Museum Victoria)

An eggcellent adaptation

Have you ever found a hard, dark-brown, spiral-shaped object on the beach and wondered what it was? It is likely this was the egg case from a Port Jackson Shark (*Heterodontus portusjacksoni*) – a truly remarkable adaptation to the problem of keeping an egg safe in the ocean. The egg case is soft when laid by the female shark and she uses her mouth to screw it into a reef or rock crevice, where it then hardens. Only around 10% of baby sharks survive to hatch, which happens after 10 to 12 months. Luckily females lay up to 16 eggs in a season, so one or two usually make it to hatchling stage, measuring around 20 cm in length when they emerge.

Adult Pork Jackson Sharks can grow up to 1.65 metres and are easily identified by their blunt heads and harness-like markings that run from their eyes to their dorsal fin, and then across the rest of their body. This camouflage allows them to blend into the dappled light of the sea floor, helping them to avoid being eaten by larger sharks. They have a number of unusual features for a shark, including a pair of nostrils, and small mouths with two different sets of teeth. This contributes to the name of their genus, Heterodontus, which comes from Greek; *hetero* meaning different, and *dontus* meaning teeth. These teeth allow the sharks to grab and crush molluscs such as shellfish, cuttlefish and octopus, although they will also eat fish. Like many sharks, the Port Jackson is a great migrator, with studies showing some individuals travel up to 800 km from the waters off Tasmania up to New South Wales. They are usually found in southern Australian waters during the summer, including the Gulf of St Vincent, and move further north when the weather cools.

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The unusual looking Pouched Lamprey (Photo: Nick Whiterod)

What's legless but climbs ladders?

Have you ever seen a fish ladder? A fish ladder is a man-made construction that allows fish to move through barriers, usually via a series of small cascading pools of water. Diadromous fish species (fish that need both salt and fresh water to complete their lifecycle) face a number of obstacles when travelling upstream and downstream along rivers that have been engineered and altered. Weirs, locks, dams and even dense reed beds can prevent the movement of fish from the ocean to rivers and back again.

A project funded by Natural Resources Adelaide and Mount Lofty Ranges has allowed for the construction and installation of several fish ladders near the entrance to the River Torrens and through Breakout Creek, a constructed channel of wetlands, adjoining the river (located in-between Tapleys Hill Road and Henley Beach Road). Since the introduction of the fish ladders, numbers of native fish species have surged. One such species is the Pouched Lamprey.

Pouched Lampreys are eel-like, native diadromous fish in which males can develop a large pouch on the underside of their bodies close to the head. They have a large sectorial oral disc, in place of a jaw, which is used as a feeding mechanism, with adults attaching themselves to the bodies of larger fish to feed on their blood and muscle. These fish are fascinating individuals, spending part of their lives as parasites. During their spawning run, which lasts 15-16 months, adults cease feeding on other organisms and migrate upstream from the ocean. It is thought that the ammocetes (juvenile individuals) feed on detritus and algae, taking over four years before metamorphosing into adults and heading back to the sea. However, as little is known about their lifecycle further research is needed.

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Climbing Galaxias journey from the sea into our metropolitan rivers and back (Photo: Jeremy Gramp)

Forget flying fish, the Galaxias can climb

If you've watched a nature documentary at some point in your life, I'm sure you're familiar with the image of hungry bears waiting patiently in the shallows of a fast-flowing river during the annual salmon spawn. The bears are playing a game of catch, trying to snatch a meal as the salmon leap up a small ledge or waterfall as they head upstream. The movement of fish from the ocean to the head of the river, a journey of up to hundreds of kilometres, is remarkable but many people don't realise that this journey occurs in our own South Australian creeks and rivers.

The Climbing Galaxias is a native fish which journeys from the sea into our metropolitan rivers and back. It is aptly named for its ability to ascend over rocks, up waterfalls and even tiered dam walls as it moves from the ocean to the river and back again.

These fish use their fins as stabilising points whilst shuffling their bodies upwards as they climb over walls. The ability to climb allows the Climbing Galaxias to move further upstream and escape pools that are quickly evaporating. This is a huge advantage allowing the movement of fish from ocean to river and back again whilst other fish are stranded.

Climbing Galaxias breed in the calm waters found in the rivers of South Australia, with the offspring heading out to sea as juveniles where they spend five to six months, before returning to the freshwater environment in spring. Climbing Galaxias can grow to 28 cm and are widespread throughout southern Australia and New Zealand.

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The Australian Ghost Shark (Photo: Fir0002/Flagstaffotos)

Elephants can fly, when they are fish

The Australian Ghost Shark, *Callorhinchus milii*, isn't a shark but is related to sharks, skates and rays. It is a cartilaginous fish. It is also known as the Elephant Fish because it has a trunk-like snout with a hoe-like end, which is covered in pores that sense movement and weak electrical fields. This sensory ability helps it to search for prey. It uses its snout to probe the substrate or sea bottom for small fish and invertebrates, including molluscs and clams. Its head has large eyes and it has sensory canals and pores.

The Ghost Shark's body is elongate and silvery, with iridescent reflections and dark, variable markings providing camouflage. Its skin is almost entirely without scales. It has two dorsal fins, the first one having a reputedly venomous spine, although it is harmless. Its pectoral or side fins, which flap like wings, give the illusion of flying through the water. The Ghost Shark lives up to 15 years and grows to 1.5 metres.

It lives in depths of up to 200 metres on the continental shelf of southern Australia, Tasmania and New Zealand. It is believed that the sexes segregate when not breeding. Females migrate into bays and estuaries from spring through to autumn to lay their egg cases in sandy and muddy substrates. The distinctive flat shaped egg cases, with a bubble in the centre and corrugated edges, are dark brown to yellowish. They are sometimes washed ashore after storms. The embryo takes up to ten months to hatch, living off a large yellow yolk sack.

Ghost Sharks are fished commercially in spring and autumn when they migrate inshore to breed.

June 8 is World Oceans Day. Maybe your class could get involved in activities or events to help our oceans.

Keywords and phrases: *Seasons; Camouflage*

References:

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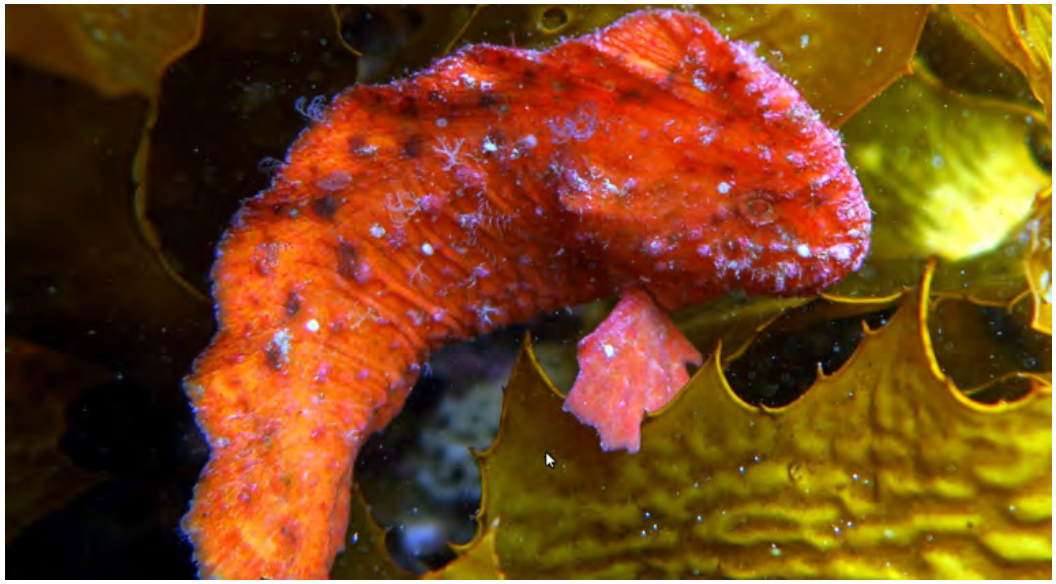

The Warty prowfish is an expert at camouflage amongst the kelp (Photo: Danny Brock)

A fish to be Prow-d of!

The Warty Prowfish (*Aetapcus maculatus*) is a strange looking fish with warty bumps all over its skin. Its colour can be yellow, pink, orange or even white and grows up to 22cm. It has a long singular dorsal fin along the top of its body but no pelvic fins.

This odd-looking fish is found along the Great Southern Reef, including reefs around South Australia.

The Warty Prowfish is a sedentary fish that is very well adapted to looking like the weed, sponge or rock it rests on or in. As it has such good camouflage, you will most likely not see this fish unless you are searching through the sea weed looking for it.

Because the Warty Prowfish does not move very much, it has to shed its skin every few weeks to prevent algae and other encrusting invertebrates from growing on it. The old outer skin becomes thin and translucent and water moves between it and the new skin. This causes the old skin to expand until it splits, allowing the fish to wriggle free.

If you're interested in our marine environment, you might like to look at The Rockpool, a hub of marine resources, or download our Beachcombing ID chart for next time you are at the beach.

References:

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Amphibians

Bibron's Toadlet - an unusual species found in the Mt Lofty Ranges (Photo: Steve Walker)

The tadpole has landed!

Most people think that frogs lay eggs in water and the tadpoles hatch out, swim around and eventually lose their tails and turn into frogs. While this is true for most species, the local Bibron's Toadlet, *Pseudophryne bibroni*, does things a little differently.

Instead of laying eggs in water, the eggs are laid on land in damp leaves, grasses or other shallow depressions following the first heavy rain in late summer or early autumn.

Then, instead of hatching out of the eggs, the tadpoles actually grow inside the eggs feeding on a large supply of yolk that the female has deposited inside the egg. At the point where you would normally expect the tadpoles to start growing arms and legs, development is halted, with the tadpoles going into a form of stasis until more heavy rain occurs and floods the area. At this point the tadpoles hatch out and complete their development in the water, much like a regular tadpole. The whole process may take six months.

Therefore, this species requires a habitat that is relatively dry for most of the year, but is subject to flooding after heavy rains. As these sorts of habitats have often been modified to prevent flooding, populations of Bibron's Toadlet have been decreasing and it is now a protected species in South Australia. They can still be found in some parts of the Mount Lofty Ranges so, if you go exploring, you may be lucky enough to see or hear some at this time of year.

You can find out more, and hear the mating call, on the Frogwatch SA website.

Ewing's Tree Frog, Litoria ewingi. (Upper inset: a male calling from a branch. Lower inset: hind leg with orange thigh and black spots.) (Photos: Steve Walker)

It's just not cricket!

We're not talking about the Ashes, but over the course of the last few months, especially during and after evening rain, you may have heard a high-pitched whistling noise, similar to the chirruping of crickets. The most likely cause of this ear-piercing cacophony is the humble Ewing's Tree Frog, *Litoria ewingi* – also known as the Brown Tree Frog or Whistling Tree Frog (though not to be confused with Verreaux's Tree Frog, Litoria verreauxi, from the eastern states, which is also known as the Whistling Tree Frog). Ewing's Tree Frog is the only tree frog native to the Adelaide and Mount Lofty Ranges and, as it is happy to co-habit with humans, is commonly seen and heard in ponds and gardens, as well as local creeks, wetlands and dams.

It is more common in the Adelaide Hills, but can also be found closer to the city in suburbs adjacent to local creeks, such as Burnside, Kingswood, Mitcham and Unley. It has been recorded along the River Torrens near the Adelaide Zoo and Botanic Gardens, and also in the Apex Wetland at West Beach. As they are commonly sold in pet stores, as tadpoles and adult frogs, their distribution is likely to increase to other suburbs.

Being tree frogs, they are great climbers, often seen on walls and windows feeding on moths and other insects attracted to outside lights. They are more than happy to set up home in a hanging basket or fern, with gardeners often reporting that they see the same individual in the same spot year after year.

Ewing's Tree Frogs vary in colour from a creamy-fawn or grey through to dark chocolate brown. They have a large brown stripe running through the eye from the tip of the nose to the shoulder, with a thinner white stripe underneath. The belly is cream and the thighs are yellow, orange or red, often with black spots. They are an absolute delight to have in the garden and do a great job controlling pest invertebrates. If you'd like to encourage them into your garden, make sure you don't use any chemical sprays and keep cats and other pets under control. You may also like to increase the habitat available to them by planting more local natives and constructing a frog bog or pond. Just make sure you don't introduce any goldfish!

Find out more about our local frogs and setting up frog habitats.

This Common Froglet has yet to absorb its tail (Photo: Daryl Gordon)

In pole position

We recently commented on the number of Ewing's Tree Frogs that can be heard at this time of year. As Monday 9 August is International Youth Day, we thought it was appropriate to mention that they are not the only frogs that are active at the moment.

This a great time to be a frog, because the winter and spring rains bring forth frogs in large numbers, all with one aim in mind - procreation - and if you go down to your local pond, creek, river or wetland, there is a really good chance that you'll find huge number of eggs and tadpoles in the water.

Many people believe that frogs lay their eggs in water and they hatch out as tadpoles, growing into frogs in a few weeks. This is true for some frogs, but not all.

The local Common Froglet, *Crinia signifera*, can turn from egg to frog in as little as 28 days, but the larger Eastern Banjo Frog, *Limnodynastes dumerilii*, may take 15 months, depending on temperature, food and water quality.

Another common myth is that tadpoles drop their tails to turn into frogs. This is not the case - they actually absorb their tails into their bodies, providing much needed energy for their relocation to land as frogs.

Find out more about frog life cycles in our teacher information pack, available on our website.

Eastern Banjo Frog (Photo: Steve Walker)

Going bonkers this silly season

Most people think that frogs are only active when it is wet, such as in winter and spring. While this is true for many frogs, it is not true for all of them.

One species that is still active at this time of year is the Eastern Banjo Frog, which is also known as the Bullfrog, Pobblebonk or 'bonking' frog, due to the loud 'bonk' call that the male frog makes during breeding season.

The Eastern Banjo Frog is a burrowing frog, spending much of the year underground, but it emerges towards the end of winter or early spring to breed. The frogs congregate around large bodies of water, especially dams and wetlands, and their loud calls are said to resemble the sound of an out-of-tune banjo. Males often take it in turn to call, with the sound travelling around the waterbody like a musical Mexican wave!

In the Adelaide and Mount Lofty Ranges they typically finish breeding towards the end of October, but they may be active right through the summer and into autumn.

A breeding pair can lay almost 4,000 eggs. Luckily they don't have to buy their offspring Christmas presents!

Tadpoles hatch in about a week and can take anywhere from four to 15 months to complete development.

Spotted Marsh Frog (Photo: Steve Walker)

Lords of the marshes

February 2 marks World Wetlands Day and the international theme for 2014 is Wetlands and Agriculture.

In Australia there is a family of frogs called Limnodynastidae, which takes its name from Greek words meaning 'lords of the marshes'. Of course, marsh is just another word for wetland, so these frogs, not surprisingly, are perfectly adapted to wetlands. We have two species in the Adelaide and Mount Lofty Ranges and they are commonly found living in and around farm dams, so they are ideal species to help us celebrate World Wetlands Day 2014.

The Eastern Banjo Frog, *Limnodynastes dumerilii*, was featured in the last weekly digest of 2013, so this time we'll concentrate on the Spotted Marsh Frog, *Limnodynastes tasmaniensis*.

The Spotted Marsh Frog is known by a number of names, including Spotted Grass Frog and Marbled Frog (also the common name of a related frog in northern Australia). They normally grow to about 3-5cm (females being larger than males) and have been known to live in captivity for over 10 years!

In the wild they can be found anywhere there is likely to be fresh water (permanent or temporary) and they typically seek refuge in grasses, reeds and sedges during the day.

They range in colour from pale grey to dull green or brown, with dark brown or green spots. Some individuals have a pale strip running down the length of their back and, despite popular opinion, this is not related to gender.

The males call while floating in water or hiding amongst the reeds and grasses, making a noise that sounds like a toy machine gun; quite fitting for a frog that looks like it's dressed in a soldier's camouflage gear!

Females lay up to about 1400 eggs in a foam nest and development into young frogs normally takes between three and five months, but sometimes this may be extended to around nine months.

Some of the many faces of the Common Froglet (Photos: Steve Walker)

Do these froglets really have so much in common?

May 22 is the International Day for Biological Diversity, and the Common Froglet (*Crinia signifera*) is a great example of where a single species can be incredibly diverse. Their colours, textures and markings can vary a lot between individuals, but there are certain behaviours and features that help us to identify them as Common Froglets.

For example, although they come in a range of shades, these little creatures are generally brown or grey in colour. Their markings are variable, but they typically have a dark triangular mark on their upper lip and a small white dot at the base of each arm. Some individuals are easier to identify than others, as these distinctive markings can be hard to see when they are a similar shade to the rest of the body.

Common Froglets derive their name from being quite small - usually only between 2 and 3 cm long - and from their wide geographical spread across the eastern states of Australia. You can find these ground-dwelling frogs almost anywhere, from underneath rocks and leaf litter to the edges of creeks, ponds and wetlands.

The call of this species is short and rhythmic, and often said to sound like a cricket but at a lower pitch. You can hear an example of this frog's call and others by visiting the FrogWatch SA website.

You could even get your class involved as citizen scientists, recording and identifying different frog calls in your area and uploading your data to the site.

The Painted Frog – a lover and a fighter (Photos: Steve Walker)

Underground art, wrestling matches and an over-inflated ego

The Painted Frog, *Neobatrachus pictus*, is an unusual frog that is found throughout southern South Australia, including the Eyre Peninsula and southern Flinders Ranges, Mt Lofty Ranges, Murray Valley and the South East.

So what makes Painted Frogs unusual? They are easily distinguished from the other frogs in the Adelaide and Mt Lofty Ranges by their cat-like vertical pupils. Being burrowing frogs, they spend most of their lives underground, only emerging after rain events to search for food and to breed. To assist them in burrowing, they have a jet-black structure on the base of each foot called a 'metatarsal tubercle' or spadefoot, which they use to dig into the earth in a backwards spiral motion.

During breeding season males develop dark 'nuptial' pads on their thumbs and fingers which help them hold on to the female. They also develop tiny spines all over their body which may be used in male-male combat. Wrestling matches have been reported in this species. The males, which lack the vocal sacs found in many frogs, produce a long, musical trill to attract females. Once a female has chosen a male, he clings onto her back and fertilises the long chain of eggs as she slowly swims through the water wrapping them around vegetation. Mating typically occurs in flooded paddocks, ditches, ponds, dams or clay pans.

In addition, Painted Frogs have interesting ways of avoiding predation. As they are short, stocky burrowers they are not very good at jumping away, so they have developed other techniques to discourage predators: firstly, they will lift themselves on all fours and inflate in an attempt to appear larger and, hopefully, bluff predators into thinking they are too big to eat. If that doesn't work, they can let off an incredibly loud scream to scare the predators away. It can be a very effective technique!

If you're interested in our local frogs, you can get involved in the FrogWatch SA citizen science project by downloading the FrogSpotter app or by registering on the website.

Peron's Tree Frog with its distinctive cross-shaped pupil and emerald spots (Photos: Steve Walker)

Maniac on the run

There are six species of frog which are considered endemic (naturally present) to the Mount Lofty Ranges; Common Froglet, Spotted Marsh Frog, Eastern Banjo Frog, Painted Frog, Brown Tree Frog and Bibron's Toadlet. In addition, sometime during the 1960s or 1970s the Southern Bell Frog was introduced into the region and it rapidly increased its population to cover much of the region. However, it now seems to have died out here, not having been recorded since the mid-1980s.

But there's a new guy in town. Since the mid-1990s there have been occasional reports of Peron's Tree Frog, *Litoria peronii*, turning up in dams and wetlands from as far afield as Kapunda, Ingle Farm, Mt Barker and Unley. In the last five or six years it has been found much more frequently in Adelaide and the Mount Lofty Ranges, most likely as a result of its availability through the pet trade. Even though it is an extremely beautiful South Australian species which can live for many years in captivity, it should not be found in our region and should never be released into the wild as it could severely impact our endemic species.

It is a very common frog in the swamps and wetlands of the River Murray in South Australia, and its natural distribution also extends throughout much of Victoria, New South Wales and southern Queensland.

Peron's Tree Frog is easily recognised by its cross-shaped pupils, black and yellow markings in the groin, armpits and the inside surfaces of the legs. It ranges in colour from pale grey-pink through to dark brown, with darker patches and a spattering of emerald green spots across its back. It is also easily identified by its distinctive, raucous call which is usually described as a 'maniacal cackle'. In fact it sounds just like a crazed witch laughing in the swamp!

If you want to find out more about our local frogs, check out our resources for investigating frogs or take action to create frog habitats at your site.

Reptiles

Shingleback Lizard (AKA Stumpy-tailed Lizard, Boggi, Sleepy Lizard, Bobtail Lizard, Two-headed Lizard & Pinecone Lizard) (Photo: Jeremy Gramp).

A lizard by any other name...

If you are a mother reading this, think for a moment what it would be like giving birth to twins so large that combined they weigh one third of your adult body weight! Welcome to the life of a Shingleback Lizard.

These lizards are one of the most interesting lizards that live in our region. You may know them from one of their many other common names. It has been suggested that they have more common names than any other lizard on the planet.

As with most of our local lizards you are most likely to see them during the warmer months when they are most active. They can however be observed during winter for short periods if conditions are mild and sunny.

For most of the year they live alone, but come spring time they pair up and for a couple of months the male and female stay side by side. You may see them walking around with the female leading the way and the male following closely behind. Each spring the same pair will seek each other out to mate. This monogamy is a rare example in the reptile world.

Shinglebacks are omnivores, eating a wide variety of vegetable matter, seedlings, blossoms and fruit. They are also great at controlling insect numbers in your garden.

There are many things that you can do to encourage these animals in your garden. Such as providing horizontal pipes, rockeries, and cavities for them to hide in, sunny paths and safe open areas for them to bask on and avoiding the use of snail baits and insecticides. Shinglebacks are also easy prey for cats and dogs, so keep that in mind if you have such pets.

If you are lucky enough to have a Shingleback living in your garden you can expect them to continue living in the area for many years.

Three-toad Earless Skink

Make sure it is the right kind of litter

In some schools, litter, like different types of packaging and plastics, can be a real problem – but there is one type of litter that can be really beneficial; leaf litter.

Leaf litter from native plants, such as gum trees, plays an important role in soil health and the recycling of other natural debris in an ecosystem. Often you may find fungi growing on leaf litter, or insects, such as beetles and ants, using it for habitat.

Another creature that uses leaf litter and may be seen scurrying around is the skink. You may have seen a long slender skink with very small legs. If it was to stay still for long enough, you could count its toes; then you could identify which species it was.

If it has three toes it is likely to be the Three-toed Earless Skink (*Hemiergis decresiensis*), or four toes, the Four-toed Earless Skink (*Hemiergis peronii*).

If it has more than four toes, you'd need to check a field ID book to look at other features. However, the Three- and Four-toed Earless Skinks are common amongst leaf litter.

Like all wildlife, skinks can be affected by the type of litter we don't want. When we think about the damage that litter can do to wildlife we realise how important it is to foster good reusing, recycling and reducing habits.

An ideal way to continue your litter awareness is to introduce nude food days or by participating in the 'littering is wrong too' campaign during Keep Australia Beautiful Week from Monday 19 to Sunday 25 August 2013.

Eastern Water Skink basking in the sun next to the Onkaparinga River at Verdun (Photo: Jeremy Gramp).

Help keep our water skinky

This week is National Water Week. It is designed to help members of the community of all ages and walks of life to understand and take action to protect and conserve our precious water resources and habitats. The theme for 2013 is Liveable Communities and the contribution that water makes to them.

A great example of a member of our community reliant on water resources and associated habitats is the Eastern Water Skink and, as their name suggests, they are quite at home living amongst our rivers and streams. In fact, the distribution of the Eastern Water Skink in South Australia is linked with waterways. In the Adelaide & Mt Lofty Ranges (AMLR) region they are found only on permanent watercourses.

The skinks can usually be seen basking on top of rocks and logs on the riverbank. When startled, they dart under a rock, log or leaves, or into the water where they can remain submerged for some time.

Eastern Water Skinks are omnivores, foraging amongst stream bank vegetation or, when seeking aquatic prey, adopting a 'sit-and-wait' tactic at the water's edge. They feed on water beetles and other aquatic insects, snails, tadpoles, spiders, small fishes, smaller lizards and native fruit.

As you can see from the photo they have a generally brownish body with black spots and a long tail. Like some other skinks they can lose their tail as a defence mechanism. Most Eastern Water Skinks grow to approximately 30cm in length.

If you are interested in seeing some, one of the most reliable places in the AMLR to observe them is in First Creek where it runs through the Waterfally Gully car park.

Eastern Water Skinks are not found where the riverine environment is 'manicured' into neat grassy areas with a few trees; they require healthy and diverse riparian vegetation.

If you are interested in assessing the health of your local waterway environment and finding out ways to improve it, check out our Engaging with Nature Riparian Habitat resources.

Juvenile Common Long-necked Tortoise from the Onkaparinga River at Clarendon (Photo: Jeremy Gramp).

Stick your neck out

May 23 is World Turtle Day.

The most widely distributed freshwater turtle in South Australia is the Common Long-necked Tortoise, *Chelodina longicollis*. However, it is an introduced species to the Adelaide and Mount Lofty Ranges; being first recorded here in 1929.

The underpart of its shell can be pale yellow to dark brown in colour and its neck can grow as long as its shell (25 cm). The neck folds back beside the shell, rather than being retracted, and it attacks its prey by extending its neck in a similar action to a snake's strike.

When disturbed it can produce a stinky liquid.

To find out more about the Common Long-necked Tortoise's habitat, check out NRM Education's Riparian habitat assessment teacher information pack, which also includes what you can do to improve our waterways.

References:

- Australian Museum
- NSW Environment and Heritage
- Victorian Department of Environment and Primary Industries

Heath Goanna, Varanus rosenbergi (Photo Richard Garnham). Inset: hatchling Heath Goanna (Photo Brian Manning)

Heath Goannas

There are three large goanna species that occur in south-eastern SA: the Heath Goanna (*Varanus rosenbergi*), Sand Goanna (*Varanus gouldii*) and the Lace Monitor (*Varanus varius*).

The Heath Goanna, also known as the Rosenberg's Goanna, can be confused with the more common and widespread Sand Goanna which is similar in size. Unlike the Sand Goanna; the Heath Goanna's tail tip is the same colour as its body, usually grey, and it has darker, curved bands on the neck, similar to a collar. The Lace Monitor has a restricted distribution in SA and is more easily distinguished from the others due to its larger size and the distinctive broad alternating dark and light colour bands around its snout.

The Heath Goanna occupies heath, wet and dry forests and temperate woodlands, usually with sandy soils and termite mounds present. It has large foraging areas ranging between 80 and 1,000 hectares. The female lays eggs during summer, burying them in a termite mound which provides the perfect climate for incubation.

In SA the Heath Goanna is classified as Vulnerable. Once common across higher rainfall, cooler areas of southern Australia, it has suffered dramatic declines on mainland SA, largely due to land clearance, habitat fragmentation and degradation, road deaths and predation by cats, dogs and foxes.

In the Mount Lofty Ranges, Northern and Yorke Peninsula, Eyre Peninsula, Murray Darling Basin and the South East regions, the Heath Goanna is Critically Endangered. It is estimated that less than 100 individuals remain in each of these regions.

If you would like to find out how you can help save the Heath Goanna please contact your local natural resource centre or download the fact sheet.

A Leatherback Turtle in the US Virgin Islands (Photo by Claudia Lombard, USFWS)

Coming out of your shell

When most people think of sea turtles in Australia they understandably associate them with the tropical waters of northern Australia. However you may be surprised to learn that of the six species of sea turtles that occur in Australia, five of them can be found in our southern Australian waters.

The most frequently reported visitor is the Leatherback Turtle. Leatherbacks are the most widely distributed of all turtle species, being found in tropical, subtropical and temperate waters throughout the world. They rarely breed in Australia, instead leatherbacks in our waters use neighbouring countries to the north of Australia to lay their eggs. They feed almost exclusively on jellyfish, with our southern waters being an important feeding ground.

The name leatherback comes from their soft leathery skin that lacks a bony shell. Interestingly they have a number of physiological adaptions that allow them to maintain an elevated body temperate in cold water and avoid overheating in warm water. They are the largest turtle in the world, with an average length of approximately 2 metres. They have some other pretty impressive stats too, being one of the deepest diving marine animals known and the fastest moving reptile ever recorded.

Leatherbacks are listed as Endangered under the Environment Protection and Biodiversity Conservation Act 1999. Threats include reduced nesting success due to disturbance and harvesting of eggs, ingestion of marine debris and entanglement in fishing gear to name just a few.

This Saturday 23 May is World Turtle Day the purpose of which is to bring attention to, and increase knowledge of and respect for, turtles and tortoises, and encourage human action to help them survive and thrive.

If you would like to learn more about the leatherback turtle, the Australian Government has a really comprehensive webpage. If you are ever lucky enough to see a sea turtle in our waters then researchers at Deakin University would love to hear about your sightings. Reporting sightings helps scientists answer vital questions about these creatures.

Red-bellied Black Snake "periscoping" our presence from the safety of a dam near Springton (Photo: Guy Draper)

Actually it's a civil serpent

The elegant looking Red-bellied Black Snake (*Pseudechis porphyriacus*) shares Australians' love of the sunshine and water. With a glossy black upper surface and a brilliant red coloured belly, the Red-bellied Black Snake is commonly found near streams, creeks, wetlands and other water bodies. Growing from 1.5 - 2.5 m in length, and being highly venomous, you can understand why these snakes are often feared. However they are reportedly placid and docile snakes and will usually protect themselves with deep hisses rather than a bite. To escape predators they may even enter the water and stay submerged with just their head showing (as shown in photo), or else dive under completely for as long as 23 minutes.

Given its habitat, it's not surprising the diet of this snake is usually frogs, lizards, small mammals and fish. When hunting in water, they have been observed deliberately stirring up underwater sediment, presumably to find hidden prey. Prey captured under water may be taken to the surface or swallowed while still submerged. Similar to many Australians, these snakes are most active during the warm day, however they may still be out and about in the warmer evenings as well. Red-bellied Black Snakes are able to maintain a body temperature in the range 28 to 31º C during the day by shuffling between sunny and shady spots. There is also an indication that they have the ability to control their temperature by behavioural (e.g. body posture) and/or physiological means (e.g. by regulating blood flow to different parts of the body).

Mating occurs in spring, and combats between rival males occur during this period. When in combat, the snakes' bodies are intertwined, with their heads raised in an attempt to place their head higher than that of their opponent. When pregnant, female Red-Bellied Black Snakes are known to congregate and bask in the sun together. Between January and March females give birth to between five and forty young in individual membranous sacs, from which they emerge shortly after birth.

References:

- http://www.reptilepark.com.au/animalprofile.asp?id=116
- https://www.australiazoo.com.au/our-animals/reptiles/venomous-snakes/red-bellied-black-snake
- http://australianmuseum.net.au/red-bellied-black-snake#sthash.IuesFsbG.dpuf

The Eastern Brown Snake is the second most venomous land snake in the world, behind another Australian snake, the Inland Taipan (Photo: Steve Walker)

Wrestling snake

Male Eastern Brown Snakes have been observed in 'ritual combat' over females – they intertwine and wrestle for half an hour or more, with each snake trying to push down and overpower the other. Following breeding, females may lay several clutches a year, sometimes in a communal nest, with an average of 15 eggs laid at a time.

The Eastern Brown Snake is quite common in the Adelaide area and has probably increased in number since European Settlement, due to increased land clearing and growing rodent populations. As well as rodents the Eastern Brown also eats frogs, reptiles and their eggs, and birds. The snakes have good eyesight and hunt by actively searching for prey, either in the open or hidden away in refuge sites. Once the prey is detected, the snake will use both venom and constriction to catch and kill it.

Fortunately, although the Eastern Brown Snake is the second most venomous land snake in the world, they often want to escape when disturbed rather than bite. The initial bite is generally painless and often difficult to detect, so anyone suspected of receiving a bite from an Eastern Brown Snake should call for medical attention immediately.

The biggest threat to Eastern Brown Snakes is becoming road kill. Another cause of death is consumption of Cane Toads. When ingested the poison from these feral pests rapidly kills the snakes and many other native predators. Fortunately Cane Toads are not currently established in South Australia.

Key words: Effects of human activities; features of animals and plants.

References:

- Australian Museum – Eastern Brown Snake
- Adelaide nature of a city; the ecology of a dynamic city from 1836-2036

Loggerhead Turtle (Photo: Brian Gratwicke)

Turtles at loggerheads with mankind

As Australians, we are lucky to be surrounded by mostly clean marine environments that help to support a diversity of marine life. The Loggerhead Turtle is one such species that can occasionally be seen within the waters off Adelaide's metropolitan coastline.

Although this particular turtle breeds in the tropical waters of Queensland and northern and central Western Australia, they are accomplished swimmers and will travel great distances in search of food. The Loggerhead Turtle has been spotted in St Vincent Gulf and the cool waters surrounding south-eastern South Australia, Victoria and Tasmania. Turtles prefer to feed on slow moving, hard bodied prey, such as crustaceans, octopus, squid and bivalves in a variety of coral, seagrass meadow and sand environments.

Female Loggerhead Turtles will only lay eggs in sand that is 25-33 degrees Celsius. They are laid into well ventilated sand in humid conditions. In Southern Queensland, the turtles that hatch on brown sand beaches are mostly female, whereas on the white sand beaches, the turtles are predominantly male. This is because during the middle incubation period the temperature of the air and sand surrounding the eggs determines the gender of the hatched turtles. The colour of the sand influences its temperature, with the darker coloured sand absorbing more heat than the lighter coloured sand, resulting in there being almost two adult males to every adult female in places such as southern Queensland, with more females choosing to breed along the white sand beaches. Females only breed every two to five years, with most not starting until 20 years of age. The life of a turtle can be precarious with many not making it to adulthood. Predation, habitat loss, threats to breeding sites, reduced food supply and pollution are all factors contributing to a reduction in Loggerhead numbers. For this reason, the Loggerhead Turtle is listed as an endangered species under Australian Law. It may also be a reason why these animals are being recorded in much cooler waters as they travel south in search of richer feeding grounds.

Tuesday 23 May is World Turtle Day, the purpose of which is to bring attention to, and increase knowledge of and respect for, turtles and tortoises, and encourage human action to help them survive and thrive.

What will you do to encourage the survival of our local turtle species?

The Mimicking Snake Lizard, Delma molleri (Photo: Matt Clancy)

When is a snake not a snake?

When it's a Mimicking Snake Lizard.

The Mimicking Snake Lizard, also known as the Adelaide Snake Lizard or Gulfs Delma is a legless lizard found across southern Australia. While it is not often seen it is common in the Adelaide Hills and in some suburbs. This legless lizard looks very much like a small snake, but is not poisonous. It is deep brown in colour on its back and often has a yellow throat. Lizards are typically measured from their snout (nose) to the vent (or cloaca), which is the posterior orifice that serves as the only opening for the digestive, reproductive, and urinary tracts. This distance is referred to as the snout-vent length (SVL). The Mimicking Snake Lizard has an SVL up to 110 mm, plus a tail up to 220 mm long, giving an overall length up to 330 mm, not unlike a juvenile snake. There are a number of differences between legless lizards and snakes:

- Snakes have a forked tongue, legless lizards don't - the Adelaide Snake Lizard has a rounded tongue.
- Legless lizards have ear openings, snakes don't.
- Snakes don't have eyelids, while some legless lizards do.
- When threatened many legless lizards can discard their tails and then grow a new one. Snakes cannot discard their tails.
- Legless lizards have small remnant hind limb flaps, snakes don't.

So next time you lift a stone and find what looks like a baby snake underneath, carefully have a closer look for those hind limb flaps, ear openings or a rounded tongue. But remember, treat all limbless reptiles with respect. More often than not they are snakes.

Most snakes aren't naturally aggressive unless attacked or cornered and they will slither away from the danger they perceive that humans represent, if given half a chance.

References:

- The Adelaide Show
- Wikipedia Delma molleri

The Pygmy Copperhead (Photos: John Langsford)

Secretive sunbathers

Summer is in full swing and, just like you and me, our native snake species enjoy any opportunity to bask in the warmth of the sun. The Pygmy Copperhead (Austrelaps labialis) is one such species that you may be familiar with if you live in the Mount Lofty Ranges.

As it is found only in the hills, the Fleurieu Peninsula and on Kangaroo Island, which are notoriously cooler areas of the state, it is particularly good at seeking out the sun. Nevertheless, it is a cautious species by nature, and prefers to avoid contact with humans. For this reason, Pygmy Copperheads often live around densely vegetated areas where they can quickly take cover in surrounding undergrowth. They are highly venomous, so if you do come across one, treat it with caution.

With a total adult length of 84 cm, they are the smallest of three copperhead species and an important part of our ecosystem. They prey mainly on common skinks and small insects.

Unfortunately, the Pygmy Copperhead is listed as vulnerable, in part due to predation by domestic and feral cats. But the good news is that we can help to reduce this simply by keeping our feline pets inside.

References:

- https://australianmuseum.net.au/copperhead
- https://snakesofsouthaustralia.weebly.com/pygmy-copperhead.html

This Barking Gecko was found in a garden at Glen Osmond (Photo: Steve Walker)

These geckos are barking mad!

The Barking Gecko (*Underwoodisaurus milii)*, also known as the Thick-tailed Gecko, is one of around 140 currently recognised Australian native gecko species. They are communal lizards and nocturnal; hunting for food at night and generally being less active during the day. Weighing 20 - 25 grams, and reaching a full-grown length of 10 – 12 cm from snout to tail, they are considered medium-sized lizards. The tail is thick and broad, tapering to a point and its body is covered in small, raised, yellow or white spots usually in lines along its head, body and tail. The dark purple-brown colour helps to distinguish it from other geckos.

Barking Geckos are terrestrial creatures living in wet coastal and forest areas, dry woodlands and arid scrubland. This means they have a wide distribution across every state and territory in southern Australia except for Tasmania. Rock crevices, and loose leaf and bark litter create an ideal habitat for them as they spend the majority of their time on the ground. For this reason they have long slender digits rather than the broad and padded toes found in many other geckos.

The Barking Gecko is so named because of the surprising, guttural bark it produces as a defence when threatened or annoyed, as well as when mating.

Their eggs have a gestation period of about 30 days and take approximately 60 days to hatch once laid. After hatching, the young are self-sufficient and can live for several years in the wild, and up to 15 years in captivity.

Keywords and phrases: Classification, Features of animals and plants, Living things live in different places

References:

- www.reptilesmagazine.com/Care-Sheets/Australian-Barking-Gecko-Care-Sheet/
- www.wildlifelandtrust.org.au/index.php/australian-wildlife-profiles/621-barking-geckos

Green Sea Turtle grazing seagrass (Photo: P Lindgren)

Don't be shellfish - think of the turtles

Wednesday 23 May is Word Turtle Day. The day was initiated in 2000 with the purpose of raising awareness of how to help protect turtles and tortoises. We thought we could spread the word by bringing you the story of one of Australia's native turtle species, the Green Turtle (*Chelonia mydas*). It is one of the largest living sea turtles and the only one which is almost exclusively herbivorous, feeding mainly off seagrasses. In fact, the regular trimming of the seagrass blades by the turtle helps to keep the grasses healthy. Interestingly, the Green Turtle gets its name not from the colour of its shell, but from the colour of its cartilage and fat, which is probably green because of the seagrasses it eats.

Green Turtles have a wide distribution, occurring in the coastal waters of 140 countries throughout the world's tropical and subtropical oceans, with individuals migrating long distances to feeding and breeding sites. Green turtles do visit South Australia, but cannot survive for long in our waters except in the warmest months. Most are found dead on the coastline as a result.

But it's not all diving and exploring the seas for this species. Listed as endangered, Green Turtles are under threat from over harvesting of eggs, hunting, habitat destruction, with many of their nesting beaches lost or degraded due to human development and pollution. Turtles often get trapped in fishing and shark nets. Like many marine species, Green Turtles have been found dead or in poor condition after ingesting discarded plastic and other debris.

As with some other reptiles, gender in Green Turtles is determined by temperature of the eggs. In Australia there are indications that rising temperature associated with climate change is impacting the ability to produce male turtles. It is a sobering reminder of how importantly we as humans need to take this issue. Populations of marine species are in serious decline as a result of human activities.

References:

- https://www.awarenessdays.com/us/awareness-days-calendar/world-turtle-day-2018
- Marine Reptiles in South Australian waters Chelonidae, Dermochelyidae, Elapidae. Mark Hutchinson

A bluetongue sunning itself on backyard paving (Photo: Amy Blaylock)

Bluetongue lizards

In summer you might hear the rustling of leaves in a garden bed, or see movement in between your pot plants, and come face to face with a Common Bluetongue lizard, *Tiliqua scincoides*. These lovely lizards grow up to 55 cm and are common in our gardens as well as a wide range of other habitats. If you approach them, they will freeze and flatten themselves, or wedge themselves into a tight space, until they sense an opportunity to make a run for it.

The stripes and colours on their backs make for excellent camouflage so they are often living alongside us without our knowledge. If you have a pair living nearby and sufficient habitat and food sources, you may soon have a booming population, as these lizards give birth to between 8 and 20 live young.

Unfortunately there are a number of threats to them in our suburbs, including predation by cats and dogs, and injury and death from lawnmowers and cars. With a diet of invertebrates (including snails) and small frogs, our indiscriminate use of pesticides can reduce prey items available to them, or poison them through contaminated prey.

Could your school or local park be home for bluetongues? Do a habitat assessment then create or improve on your wildlife friendly garden. You can also borrow an observation camera to explore whether small spaces are being used as shelter.

Key words: ecosystems, habitat, predators and prey, interdependence

References:

- Creating a wildlife friendly garden
- Wildlife of Greater Adelaide by James I.D. Smith. 2016. Barbara Hardy Institute at UniSA

Cunningham's Skink is a vulnerable species in the Adelaide and Mt Lofty Ranges (Photo: Rob Wallace)

This prickly character loves socialising

Cunningham's Skink, *Egernia cunninghami*, is a large spiny lizard - up to 15 cm from snout to vent - with a long spiky tail and strong legs. Colour varies from dark brown to almost black, with variable patterns including flecking and stripes. It is a vulnerable species in the Adelaide and Mt Lofty Ranges, meaning it is likely to become endangered unless the population increases and things that threaten its survival and reproduction are removed.

Its distribution ranges from the Great Dividing Range in south east Queensland, through New South Wales and to central Victoria, with an outlier population in the cooler parts of the Mount Lofty Ranges and Fleurieu Peninsula. The Mount Lofty Ranges is an important island refuge for many species that are not found elsewhere in South Australia, with the nearest populations usually being in the eastern states.

Cunningham's Skink prefers Grassy Woodlands, and Coastal and Heathy Forests. It loves rocky areas with crevices and can be seen lying on rocks out in the sun. Its diet includes leaves, fruit and invertebrates such as snails, slugs and insects.

Cunningham's Skinks have a number of strategies to protect themselves from predators: They live in social groups, so they have many sets of eyes looking for danger, and escape into nearby rock crevices or log hollows, where they can inhale air to increase their body size and wedge themselves in. The spiky tail and slightly spiny body also makes it hard for a predator to dislodge them.

Potential threats include: habitat loss (rock removal, including moss rocks); illegal hunting and collection; predation by foxes and cats; site/habitat disturbance (livestock and rock climbers); pesticides; fire and fire management activities; climate change and drought. Mining may also pose a threat to some subpopulations.

References:

- Adelaide and Mt lofty Ranges Threatened Species Profile – Cunningham's Skink
- Cunningham's Skink. The Australian Museum
- Museums Victoria Collections Egernia cunninghami (Gray, 1832), Cunningham's Skink

A brightly coloured male Tawny Dragon (Photo: Jeremy Gramp)

Here be dragons

Did you know that it is currently dragon season? October is the month when the vast majority of dragon sightings occur. By 'dragon' we are referring to one of our local dragons, the Tawny Dragon (*Ctenophorus decresii*), which is a medium-sized lizard that grows to about 20 cm in length. They live in rocky habitats, basking on the warm rocks and hiding in crevices when the need arises.

In our region there are two distinct forms of Tawny Dragon. The southern form is found in the southern Mount Lofty Ranges (from the Barossa Valley in the north (Tanunda and Angaston) to the southern ocean in the south) and Kangaroo Island, while the northern form occurs from the northern Mount Lofty Ranges all the way up to the Flinders Ranges.

Tawny Dragons are sexually dimorphic, which means that the males and females look distinctly different. The males are more colourful than the females or juveniles, with the throat area being the colourful part. Interestingly this colour varies not only between populations but also within populations.

Males are highly territorial; you'll often see them perched on a rock looking out for rivals. If they encounter another male they often exchange aggressive behavioural displays including head bobbing and push ups.

Now is the perfect time to get out into our parks and see if you can spot some Tawny Dragons. Conservation Parks such as Morialta, Black Hill and Para Wirra are some places where Tawny Dragons are readily sighted. If you approach carefully they will often stay still and you can observe them, but make sure not to get too close to them.

Birds

Red-necked stint (c) JJ Harrison

A long journey ahead for the Red-necked Stint

As term 1 comes to a close and you start thinking about going away for the school holidays, spare a thought for the numerous migratory birds that have spent the warmer months here in Australia. These birds, including Red-necked Stints, have a long journey ahead of them.

The Red-necked Stint, *Calidris ruficollis*, is a small wading bird that breeds in the Arctic tundra around Siberia and western Alaska during the northern spring and summer. As autumn approaches, they make their way south to warmer conditions in South East Asia, Australia and New Zealand, some of them migrating more than 12,000 km!

Once they have arrived down south, they form large flocks, often with other species of migratory birds, along inter-tidal mudflats, estuaries and shallow inland lakes and wetlands.

They feed on a variety of small aquatic invertebrates, detecting their food by sight and rapidly pecking at them in the soft mud.

At the end of summer, they then have to make the long journey back to their breeding grounds in the northern hemisphere.

If you are interested in finding out more about the Red-necked Stint, why not have a look at the book 'Rusty Loses His Loop' which is available as a class kit for loan from our loan library - just look in the 'Birds' pdf. Other resources about migratory birds are also available.

In addition, why not try monitoring the birds at your local river or wetland as part of our Engaging with Nature Wetland Birds activity?

Sacred Kingfisher (Photo: Steve Walker)

Where have all the Sacred Kingfishers gone?

The Sacred Kingfisher, *Todiramphus sanctus*, is a medium-sized kingfisher that can be found around mangroves, parks and gardens,freshwater lakes, swamps and other water ways in mainland Australia and New Zealand, offshore islands and other parts of the western Pacific, including New Guinea and Indonesia.

Although they breed in most parts of coastal and sub-coastal Australia during spring and summer, the Sacred Kingfishers in southern Australia migrate during autumn to spend the winter in the warmer, northern locations. They will return south again in August and September.

Male and female birds construct the nest together, which is usually either a hollow in a tree, or a burrow dug in a river bank or termite nest. The female lays three to five eggs, and both birds incubate them and take care of the young.

Sacred Kingfishers feed on a variety of insects, small crustaceans, fish, small rodents and reptiles, which they catch by diving into water or pouncing onto the ground from a perch in a tree, wire, post or stump. They usually return to the perch to consume their prey.

'World Migratory Bird Day' is held 11-12 May 2013. Join the global celebration or find out more about monitoring our local wetland birds.

Yellow-tailed Black Cockatoo. (Photo: www.flickr.com/photos/seabamirum/6334349321/)

Volunteering for the Yellow-tailed Black Cockatoo

In Australia there are currently 6 million people that volunteer annually, contributing an enormous amount to society. This week is National Volunteer Week where we celebrate the efforts of all these volunteers.

It is not just humans that benefit from the work of volunteers, so do many of our native species and ecological communities. One such species is the Yellow-tailed Black Cockatoo.

The Yellow-tailed Black Cockatoo is the largest of the cockatoos found in the Adelaide and Mt Lofty Ranges (AMLR) region. It is easily identified by its predominantly black plumage, with a yellow patch on the sides of its head and yellow panels on the tail. Small flocks of the birds can often be seen flying in the open sky above the tree canopy. They have a very distinctive far-carrying call, often described as a 'wee-lar' sound.

They are a threatened species, currently listed as vulnerable in South Australia, with the main threats including the loss of large native trees and shrubs used for food and nesting hollows.

During the last two years, volunteers have been involved in an annual census of the cockatoos and have helped confirm that there are approximately 2000 individual birds remaining in the AMLR.

Volunteers have also been instrumental in helping to address the lack of food for the birds. A number of local schools, with the help of Friends of Parks groups, have planted native foods for the birds, including hakeas and banksias. The Department of Environment, Water & Natural Resources (DEWNR) has distributed free food plants to volunteers to plant on their properties, and host 'Plant-a-feast' community events to help re-establish native food resources for the birds.

If you are interested in participating and helping these amazing birds then please contact DEWNRThreatenedWildlife@sa.gov.au for further information and registration details.

The Australian Magpie (Photo: Steve Walker)

Go the mighty magpies!

Love them or hate them, the mighty magpies - no, not the footy team - are an ever present part of our environment.

The Australian Magpie, *Gymnorhina tibicen* (or *Cracticus tibicen*, depending on which scientist has your allegiance), is a distinctive black and white bird that is very common throughout much of Australia and Papua New Guinea.

They can live for about 30 years and are usually found in large social groups. As they are very territorial, especially during the mating season between August and October, they commonly swoop people and other animals that enter their territory.

Australian Magpies only feed on the ground, so they prefer open grassy areas that also have plenty of trees with nesting and roosting sites. They are very common in urban parks, farms, gardens and along roads and creeklines. They mainly feed on invertebrates - it's great fun to watch them listening for and pulling up worms - but they also eat frogs, lizards and seeds.

Australian Magpies are great vocalisers, producing complex calls that may mimic barking dogs and other birds. Australian Magpies are sometimes known as Piping Shrikes, as featured on the South Australian flag, badge and coat of arms, because their songs can range over four octaves and may exceed 100 decibels; the volume produced by a chainsaw. In fact, the Latin name *tibicen* means 'piper' or 'flute player' so it is a great description for this little Aussie larrikin!

Red-necked Stint (photo: JJ Harrison)

Fly me to the moon

World Migratory Bird Day is on this coming weekend (10-11 May).

At this time of year, many of our Australian birds migrate to the northern hemisphere. One such bird is the Red-necked Stint. They breed in eastern Siberia and western Alaska and visit Australia (15,000 km away) only in summer. When they are breeding their feathers are a rusty red colour, giving them their name. After breeding they moult, and throughout the rest of the year they are grey backed, with white underneath. In its lifetime (approximately 20 years) the Red-necked Stint flies further than the distance between the Earth and the Moon!

Red-necked Stints are sandpipers; they have short straight bills, short legs and are quite plump in shape. They weigh approximately 30 grams, as much as a box of matches. When in South Australia they choose mudflats within estuarine wetlands, sand flats and inland salt lakes as their habitats. Their favourite food at the Coorong is midge (chironomid) larvae, and they find these on the surface of saturated mudflats.

Flocks of migrating birds rely on a series of three to four stopovers so they can rest and find food on the journey from their breeding sites to their 'wintering' sites. If any one of these places becomes unsafe or degraded, it can be disastrous for them. To talk more to young children about migratory birds, read 'Rusty Loses His Loop', a book written by Josie and Matthew Wright-Simon. You can borrow it from our loan library.

Much of this information is from the Bioregions resource. The resource has factsheets about local animals and plants as well as local habitats.

The iconic Laughing Kookaburra (Photo: Jeremy Gramp).

Bushman's alarm clock

One of the most iconic sounds in the Australian bush is the Laughing Kookaburra. However it is not just bushland where these birds are found; their habitat also includes parks, gardens, farmland, orchards and suburban backyards. Basically any area where there are suitable trees. Their natural range extends throughout eastern Australia from the tip of Cape York all the way around to the Eyre Peninsula and they are certainly one of the most recognisable bird species that we have in our region.

They can be identified not only by their laugh but also by their distinctive kingfisher beak and dark brown eye stripe across the sides of their face. An easy way to tell the difference between an adult Kookaburra and a juvenile is by looking at their beaks; the lower half of an adult's beak is pale, as in the photo above, whilst juveniles have shorter beakers which are a more uniform, darker beak colour. The distinctive laughing sound that the birds make is actually a territorial call, advertising to other birds to stay away. They live in one place for most of their life and it is thought that they pair with the same partner for life.

Trees are essential for Kookaburra survival for a number of reasons.

Firstly, they are used as perches for hunting. Kookaburras sit on the perch studying the ground waiting to spot their prey, which they then fly down and grab in their beaks, before returning to the perch to eat. The majority of their food consists of insects and other invertebrates; however larger animals such as lizards, snakes, mammals and frogs may also be eaten. These larger animals are killed by bashing them against a branch or rock. People are often tempted to feed kookaburras meat, but this is not advised, particularly as meat does not include all of the essential nutrients and calcium that their natural food sources contain.

Kookaburras also nest in cavities and, being large birds, they rely on the bigger hollows that typically only occur in older, established trees.

If you are interested in involving your students in learning more about our local native birds and undertaking actions to assist in their survival, visit the terrestrial bird section of our website. We have numerous teacher resources, units of work and ID charts available.

The Nankeen Kestrel (Photo: Jeremy Gramp).

Nankeen as mustard

The Nankeen Kestrel (*Falco cenchroides*) is a small falcon and one of the most commonly-seen birds of prey in Adelaide, especially along coastal dunes and sparsely wooded areas. They are recognised by their reddish-brown backs and light coloured bellies, with long slender wings and a rounded tail. Most obvious however, is the characteristic way they hunt – hovering above prey with their heads still whilst their wings beat furiously.

Small insects and other animals are on the menu for this skilful hunter, including mice, skinks, centipedes and spiders. The Nankeen Kestrel is such an agile flier that even birds and winged insects can be plucked from the air by its powerful talons.

Pairs of birds are often seen together, as many Nankeen Kestrels mate for life, performing amazing aerial courtship displays between July and February. This is also when you are most likely to hear their shrill 'keek-keek-keek' or 'keekeekee' calls.

Birds of prey have vision superior to our own and can detect tiny movements from long distances. This superior vision also includes their ability to see in ultra-violet, which means the Nankeen Kestrel can see the scent and urine tracks of animals, giving them an advantage in knowing where their prey will appear.

For ID charts featuring these kestrels and many other bird species, visit the plants and animals page on our website.

References

- www.arkive.org/nankeen-kestrel/falco-cenchroides/image-G139568.html
- www.raptor.org.au/fcenchroides.html

Adelaide Rosellas forage in trees and shrubs, as well as on the ground - usually in shaded areas (Photo:Steve Walker)

Adelaide Rosella

There are 20 species of parrots found in the Adelaide region. One of the most common and beautiful of these is the Adelaide rosella (*Platycercus elegans adelaide*). The Adelaide rosella has plumage characteristics of both crimson and yellow rosellas, of which it may be a hybrid. Their colour ranges from yellow with a reddish wash to dark orange. Young rosellas are green-olive to yellowish-olive and develop adult plumage over 15 months.

The natural diet of rosellas includes the seeds of eucalypts, grasses and shrubs, as well as insects and some tree blossoms. Rosellas nest in tree hollows lined with wood shavings and dust. The female incubates the eggs, but both sexes care for the young. The chicks remain dependent on their parents for 35 days after leaving the nest.

The Adelaide rosella inhabits many environments including timbered valleys in the Mount Lofty Ranges, open forests and woodlands, watercourses, mallee, farmlands, roadsides, parks, gardens and suburban backyards. Because of the power of their beaks and their enthusiasm for chewing, parrots can damage trees, wooden sheds, eaves and houses as they prepare their nest sites. Parrots can also damage flowering and fruiting plants and can be regarded as pests of cherry, grape, apple and pear crops in the Adelaide hills.

Listen out for their brassy 'kweek-kweek' call while in flight, or their mellow piping whistle when perched!

If you are interested in involving your students in learning more about our local native birds and undertaking actions to assist in their survival, visit the terrestrial bird section of our website. We have numerous teacher resources, units of work and ID charts available.

References:

- Daniels, C. & Tait, C. Adelaide Nature of a City: The Ecology of a Dynamic City from 1836 to 2036. BioCity: Centre for Urban Habitats, South Australia.
- Pizzey, G. & Knight, F. (1999) The Field Guide to the Birds of Australia. Harper Collins Publishers, Australia.
- www.birdlife.org.au/bird-profile/crimson-rosella

Sharp-tailed Sandpiper (Photo: Paul Wainright)

'Sharpie' the Sharp-tailed Sandpiper

World Migratory Bird Day runs from 9-10 May. It is a chance to celebrate and promote the need to conserve our migratory birds and their habitats!

Migratory birds fly hundreds and thousands of kilometres to the best habitats for feeding, breeding and raising their young, however their journey is often a perilous and exhausting one. Migratory birds are exposed to a wide range of threats often caused by human activities, including poaching and a loss of habitat and stop-over sites during their migration, all of which has a dramatic impact on the birds' chances of survival.

For some species such as the Sharp-tailed Sandpiper, a significant portion of their population travels here to South Australia to enjoy our Dry Creek Saltfields, adjacent to the Adelaide International Bird Sanctuary. Flying in from arctic Siberia, they begin to arrive in August and stay until March the following year, before making the long journey back north to their breeding grounds in the Arctic tundra.

When here the Sharpie prefers the grassy edges of shallow inland freshwater wetlands and flooded fields, mudflats, mangroves, rocky shores and beaches.

With a dry 'wit-wit' call, Sharpies can often be seen with other shorebirds such as the Curlew Sandpiper and Red-necked Stint when foraging. Feeding on aquatic insects, larvae, worms, molluscs, crustaceans and seeds, Sharpies will move slowly across the shallow waters and mudflats, rapidly pecking small prey from the mud.

To get involved this May and celebrate World Migratory Bird Day, check out our Wetland Birds Teacher Information Pack and visit your local wetland to conduct a wetland birds survey, or read Rusty loses his Loop with your class and explore the threats facing migratory birds in the Coorong.

The characteristic stiff tail and (inset) lobed bill of the Musk Duck spotted recently at Hart Road Wetland (Photo: Steve Walker)

A stiff tail and a droopy bill

If you're lucky you might have the good fortune to encounter possibly the weirdest water bird in Australia. Although considered rare in South Australia, the Musk Duck (*Biziura lobata*) can sometimes be found in natural and artificial wetlands that have deep, still water and reed beds, such as the Hart Road Wetland constructed in 2013 at Aldinga Beach.

Musk Ducks can easily be identified by their long stiff tail feathers and the fleshy lobe under the beak, which is significantly larger in males, particularly during breeding season. Both males and females have a relatively drab grey-brown pin-striped body, which get paler towards the chest, dark grey bills and dark brown eyes.

Males are territorial, especially during breeding season, when they will display by fanning out their tails, tilting their heads right back, inflating their lobes and kicking the water to create a loud splash while also whistling loudly.

Musk Ducks are incredibly graceful in the water and can twist and turn on the surface or dive with ease, steering with their tail and powerful legs which are further back on the body than other ducks. However they rarely walk on land, their back-set legs making walking a clumsy affair, and they only fly if forced to do so. They are so at home in the water that they actually sleep there, with their head tucked into the body or under one of their wings.

If you are interested in finding out more about some of the interesting birds that frequent our wetlands, why not download the wetland birds teacher information pack and identification chart and take your students on a birdwatching expedition?

You can download other plant and animal resources here.

References:

- http://www.birdlife.org.au/bird-profile/musk-duck
- https://en.wikipedia.org/wiki/Musk_duck

This Musk Lorikeet makes use of a tiny hollow in a gum tree

The masked musketeer

The Musk Lorikeet, *Glossopsitta concinna*, is a medium-sized parrot which is often mistaken for the Rainbow Lorikeet as they have similar green feathers. However, a distinctive red mask across its eyes is a feature which helps distinguish the Musk Lorikeet. It also has a shorter tail.

You may encounter them nibbling at your fruit trees, often with other types of parrots, as they are noisy and social animals. They are endemic (only found in this area) to South-Eastern Australia, breeding in hollow branches and holes in living eucalypts, often near watercourses.

Hollows typically form in living trees that are 80 to120 years old or more. Musk Lorikeets typically make use of hollows which have very small entrance holes, so they really have to squeeze to get in. The eggs are laid on a base of chewed or decayed wood and whilst just the female incubates them, both parents roost in the hollow at night.

For more information about nest hollows, check out the Nest Boxes and Hollow Habitat Assessment Teacher Information Pack.

Reference:

- http://www.birdsinbackyards.net/species/Glossopsitta-concinna

The Purple Swamphen with its distinctive white undertail and red forehead shield (Photo: Steve Walker)

The flashing white bum bird

This Tuesday 22 March is World Water Day, which provides a fantastic opportunity to learn more about water related issues, be inspired to tell others and take action to make a difference.

One of our local creatures relying heavily on watery environments is the Purple Swamphen, a large waterhen with a bright red bill and forehead-shield, and a deep blue to purple head and breast.

Purple Swamphens are proficient swimmers but generally prefer to walk along the edges of water amongst the reeds and other vegetation. In fact, a key identifying feature can be seen when swamphens walk; they flick their tail up and down exposing a bright white undertail. They are also surprisingly good fliers, with their long legs and toes hanging underneath their body and trailing behind them.

Purple Swamphens are found throughout the Adelaide and Mt Lofty Ranges, wherever suitable habitat occurs, such as the margins of swamps, wetlands or water courses that contain dense rushes or reeds. They eat the soft shoots of the reeds and rushes, and are also known to eat small animals, such as snails, frogs and even the occasional duckling.

The reeds and rushes are also critical habitat for their breeding as the reeds are used to form a nest which is situated on a platform made from reeds and other vegetation which they have trampled down.

If you are interested in learning more about the Purple Swamphen and other water birds in your area, visit the wetland birds section of our website where you can find an ID chart and teacher information pack.

Reference:

- http://www.birdsinbackyards.net/species/Porphyrio-porphyrio

A Double-banded Plover at Ralph's Bay, Lauderdale, Tasmania (Photo: JJ Harrison)

Flying west for the summer?

At this time of year most migratory birds have their minds on warmer climes, heading towards the northern hemisphere summer. One exception is the Double-Banded Plover (*Charadrius bicinctus bicinctus*).

This small wading bird is common in the south of New Zealand, where it breeds on shingle banks in the beds of inland braided rivers (rivers with a network of small channels separated by small, often temporary, islands). They are highly faithful to a nest site with both parents incubating the eggs. After hatching, chicks forage close to the nest.

Once breeding has finished many Double-banded Plovers fly across the Tasman Sea so that they can spend the winter foraging on mudflats and estuaries in Australia, usually arriving in March or April. They are normally found overwintering in the eastern states but have occasionally been known to travel all the way to Western Australia.

Whilst breeding, the male is white below and grey-brown above with two bands across the chest; a black upper band and a wider chestnut lower band. The legs are greenish-yellow and the short slender bill is black. The breeding female is duller in colour with a narrower frontal bar.

However you would normally expect to see non-breeding birds in Australia. In these individuals, the upper chest band fades to a dull grey and the chestnut becomes less visible.

Why not head out to a local estuary, such as the Onkaparinga River, and see what birds you can find? Birdwatching equipment such as class sets of binoculars can be borrowed from our loan library, subject to availability. Bird ID charts are also available for download from the Plants and Animals page.

References:

- Birdlife Australia
- Birds in Backyards

Dusky Moorhen (Photo: Steve Walker)

Moorhen for your money

This Friday is Australian Red Nose Day, the major fundraiser for SIDS and Kids, where participants help to raise awareness and money by wearing a bright red nose. Keeping with the red nose theme, one of our local bird species, the Dusky Moorhen, is well qualified to participate. The Dusky Moorhen is a dark-grey medium-sized waterbird that has a red bill with a yellow tip and a red facial shield, males having a more prominent shield than the females. The legs of both the males and females can vary from a yellow-orange colour through to olive green. Their long toes are perfectly adapted to walking on soft, uneven surfaces. Dusky Moorhens are commonly found in and around wetlands, swamps and rivers. They have a preference for water featuring reeds, rushes and waterlilies at the margins. They are also often found on lawns and grasses near the water. They can sometimes be confused with two similar looking water birds, the Eurasian Coot and the Purple Swamphen. However they can actually be easily distinguished; the Eurasian Coot has a white beak and facial shield, while the Purple Swamphen is much larger and has a distinctive purple-blue colouring to its body.

Dusky Moorhens are omnivores, eating a wide variety of foods including water plants, algae and grasses, as well as seeds, fruits, and invertebrates. When feeding in the water they don't actually dive underwater, instead just upend themselves leaving their tail poking up in the air. During the breeding season they form groups of up to seven birds, with the whole group helping to build the nest and look after the young. The nests are constructed by pulling down the stalks of reeds and other water plants and using their bodies to press them into shape.

If you would like to learn more about waterbirds visit the wetland birds section of our website where you can find an ID chart and teacher information pack. If you are interested in raising money for Red Nose Day you can host your own School Red Nose Disco. Funds raised through Red Nose Day activities help to provide vital services and programs to the Australian community.

Keywords and phrases: plants provide shelter; adaptation; seasons; camouflage; lifecycles; consumers; food webs; classification; predator and prey relationship; living things live in different places; effects of human activities; competitive relationship; living things depend on each other; features of animals and plants.

Grey fantails are widespread throughout most of Australia (Photo JJ Harrison)

The ever-inquisitive Grey Fantail – your friend in the bush

If you've been walking in woodlands there's a fair chance you've seen a small grey, white, and buff-coloured bird flitting around - constantly on the move, doing aerial twists and turns in the lower branches or the canopy of trees. It will have its tail fanned out and be constantly chattering. It looks a bit like its cousin, the Willy Wagtail; but wearing a different set of colours.

These friendly and inquisitive birds that often hang around in twos or threes are Grey Fantails.

Grey Fantails are widespread throughout most of Australia; living in woodlands, scrub, mangroves and along watercourses. Grey Fantails prefer these areas as they provide habitat for their main food source – invertebrates - and you will often see them chasing flying insects and plucking them out of the air.

Grey Fantails breed in wooded areas where they construct a finely-woven nest, which is shaped like a baseless wine glass in the forks of tree branches. They use grass, bark, other plant materials, and spider webs to make the nest.

Both parents share nest-making, incubation, and feeding duties.

Grey Fantails will sometimes visit gardens, especially when they migrate during winter, often making use of Eucalypt trees.

As well as being native to Australia, Grey Fantails are found in the Solomon Islands, Vanuatu and New Caledonia.

The Common Bronzewing with its distinctive eye stripe and coloured wings (Photo: Steve Walker)

The Bronzewings are all a clatter

As one of the most commonly seen pigeons in Australia, you would probably know the Common Bronzewing, *Phaps chalcoptera*, by the clatter created by its wings as it flies away. With its distinctive white eye line and patches of bronze, orange and green found on its wings, you will often spot a Bronzewing on the ground pecking for seeds in grain stubble, or under seeding wattles.

Apart from rainforests and dry arid areas, the Bronzewing can be found in a range of different habitats such as woodlands, forests and scrub as well as being common in gardens and farmland, both in coastal and inland areas.

You can see them wandering alone, in pairs or in groups, and will usually never be far from a water source as they need to drink frequently. You may even see them at dusk flying to a nearby creek, lake or dam.

What kind of habitat were you in when you last spotted a Bronzewing? Have a go using our Bird Identification Charts and see what other birds you can spot, or explore the importance of habitat for birds using our Looking at Habitat Diversity Through Birds Learning Sequence.

References:

- Birdlife Australia
- The Field Guide to the Birds of Australia by Graham Pizzey and Frank Knight

Keywords and phrases: living things live in different places; food webs.

Rainbow Lorikeets preen and nibble at each other when resting (Photo: Rob Wallace)

Rainbow Lorikeets don't keep their broom in the cupboard

If you've ever noticed a flash of bright green, red, blue and yellow as a flock of birds scream past in bullet-like flight, there's a fair chance they are Rainbow Lorikeets. The Rainbow Lorikeet is a 28 to 32 cm long colourful parrot with a long tail and a red beak. Rainbow Lorikeets live along the coast through to hilled areas from northern eastern Australia, through the eastern seaboard to South Australia. Outside of Australia their natural range includes eastern Indonesia, Papua New Guinea, Vanuatu, New Caledonia and the Solomon Islands. They have also been introduced to Western Australia.

They live in areas dominated by trees, ranging from rainforest through woodlands to urban settings. They are one species of native birds that has coped well with clearance and settlement, spending most of their time in trees eating pollen, nectar, fruit, seeds and insects in the suburbs or natural bushland. Their brush tongue helps them to feed on nectar, pollen and fruit. Like many other parrots they usually breed in tree hollows, laying two to three white eggs on chewed, decayed wood. The female incubates the eggs for about 23 days, but both parents feed the young. Pairs are thought to breed for life. They preen and nibble at each other when resting. They often fly and seek food in trees in mixed species foraging flocks with other lorikeets. This has benefits to each species as there is safety from predators in numbers as there are more birds to watch for danger, than in small flocks or individually. It's best not to feed lorikeets and other birds from bird feeders. They can get dependant on you and not cope well if you don't feed them for a period of time. They can catch necrotising enteritis from poor hygiene and have a limited diet from bird feeders. They can also catch psittacine beak and feather disease, spread from the faeces of sick birds. These all lead to early death in lorikeets.

References:

- Australian Museum; Rainbow Lorikeet
- Australian Wildlife: Rainbow lorikeet
- Birds in backyards: Rainbow lorikeets
- The Dangers of Feeding Lorikeets
- The Graham Pizzey and Frank Knight Field guide to the Birds of Australia. Graham Pizzey and Frank Knight.
- Hayden's Animal facts – a blog about animals to help educate kids about wildlife

The distinctive long, downward curving bill of the Eastern Curlew allows the bird to source food from well below the surface (Photo: Dick Daniels)

Circumnavigating the globe with the Eastern Curlew

In recognition of International Migratory Bird Day on Saturday 13 May, we take a closer look at the magnificent Eastern Curlew, the largest wading bird found within Australia. With its long, curved bill and distinctive call, which can only be described as a 'cuurrrlllew', giving rise to its common name, the Eastern Curlew is easily identified along coastal mud and salt flats. However, it is a timid bird that will avoid people and take flight easily when approached. Along with a number of other migratory bird species, the Eastern Curlew can be seen at the Adelaide International Bird Sanctuary (AIBS) throughout the warmer months of the year. As is typical of migratory birds, it requires shallow waters along the coast to feed. These stretches of land are in decline globally, with many important feeding sites being lost to development. Over 75% of the global Eastern Curlew population spend their summers in Australia. Sites such as the AIBS, provide a vital protected habitat for migratory birds to return to every year. Eastern Curlews breed in Russia and north-eastern China and can be seen throughout Japan, Korea and Borneo on their journey to and from Australia.

When watching wading birds along coastal areas, you will notice that many different species congregate in similar areas. But each migratory wading bird species tends to occupy a separate niche, gaining food from different points on and under the mud or sand. The bill of each species provides a clue to the diet of the bird and where and how it locates its food. The Eastern Curlew uses its long downward curved bill to probe deep into the ground in search of mud crabs and other crustaceans. Unfortunately, the Eastern Curlew has recently had its status changed from Threatened to Critically Endangered, reflecting the low numbers of birds recorded throughout Australia and the migratory route they take between Russia and New Zealand/Australia, known as the East Asian Australasian Flyway.

The NRM Education team has created a Migratory Shorebird educator's kit, designed for students aged 9-12, that is available on the Coastal and Marine section of the Natural Resources Adelaide and Mount Lofty Ranges website.

The Ruddy Turnstone can be seen in summer along the beaches and mudflats of South Australian shores (Photo: Andreas Trepte)

Leave no stone unturned

Global Wind Day, celebrated on Thursday 15 June, represents a great chance to appreciate an amazing group of animals, migratory birds. These birds use the prevailing winds, updrafts and their wings to fly from one hemisphere to another in search of food and a warmer climate. Migratory shorebirds can travel up to 25,000 kilometres within one year, so some of these birds fly the equivalent distance of the earth to the moon within their lifetime. South Australia is lucky because quite a few migratory bird species visit our backyard every year. The Ruddy Turnstone is one such bird that can be found along the shores of our coastline. To get to South Australia, the Ruddy Turnstone travels along a migratory route, known as the East Asian Australasian Flyway, a route that crosses 23 countries from New Zealand/Australia in the south to the edge of the arctic in the north. If you're lucky, you can see the Ruddy Turnstone along any of the beaches in the Adelaide International Bird Sanctuary from November to April.

The Ruddy Turnstone searches for food on the surface of sand and mud banks, shallow pools, rock shelfs and exposed reefs. Its name comes from the bird's tendency to use its bill to flip over stones, seaweed and other items along the shore, in search of food. The behaviour, size and the appearance of the Ruddy Turnstone make it one of the easier birds to identify, both in flight and whilst feeding along the shore. No other migratory shorebird exhibits the same distinctive facial markings, colouration, size and behaviour. Unlike many species of migratory shorebird, the Ruddy Turnstone is not easily scared and will only take flight when perceived threats are quite close by. For those who are new to bird watching or keen to get involved, the Ruddy Turnstone is a great coastal bird to observe.

NRM Education has created a Migratory Shorebird educator's kit, designed for students aged 9-12.

References:

- http://birdlife.org.au/documents/Shorebirds-FactSheet.pdf
- www.researchgate.net/publication/44584576_Extreme_Endurance_Migration_What_Is_the_Limit_to_Non-Stop_Flight
- www.researchgate.net/publication/44601963_Orientation_and_autumn_migration_routes_of_juvenile_sharp-_tailed_sandpipers_at_a_staging_site_in_Alaska

The Eastern Spinebill (Photo: Steve Walker)

A specially adapted beak and tongue

It is always a treat to see the Eastern Spinebill as it is much less common than the New Holland Honeyeater. The Eastern Spinebill enjoys being in shrubbery and small trees. If you are lucky you will find it hovering in the same spot, whilst drinking nectar from a bell-shaped flower. The long fine down-curved beak is especially designed for getting nectar from bell-shaped flowers, although they drink nectar from a variety of flowers and eat insects.

Eastern Spinebills are a part of the honeyeater family, many of which have the special trait of a distinctive brush-tipped tongue which can soak up liquids. According to The Guardian, the birds "lap nectar from flowers much as cats lap milk from a dish, although the birds' lapping movements are much faster. When the liquid-moistened brush is pulled back into the bird's mouth, the brush is squeezed against the upper mandible (roof of mouth) to push all fluid out so the bird can swallow it"; so the tongue acts a bit like a sponge.

Scientists have been looking at the DNA of the honeyeater family and they have found that as the species in the family evolved (like the spinebills) their beaks and tongues became more specialised at collecting nectar.

Eastern Spinebills, mainly females, make their small cup-like nests combining a variety of materials together like hair, grass, bark strips and spiders' webs. It is mainly the female bird who builds the nest and incubates the eggs, but both male and female birds will feed their young.

If you want to find out more about our local birds, NRM Education has two units of work related to birds and several bird ID charts.

References:

- Birds in backyards – Eastern Spinebill
- The Guardian – Mystery bird: Eastern Spinebill, Acanthorhynchus tenuirostris

Key words: classification, features of animals and plants, adaptation.

Brown Goshawk at Mount Majura in Canberra (Photo: Dusty, Canberra Nature Map)

A bird with a taste for other feathered flyers

The Brown Goshawk, *Accipiter fasciatus*, can be found all over Australia but it is partly migratory in southern Australia – moving to northern areas in the winter months. This raptor (bird of prey) is a medium-sized hawk with yellow eyes and legs and a wing span of 70 to 100 cm. Its habitat includes open forests, woodlands, scrublands, golf courses and even sewage farms.

Goshawks' menu consists of other medium-small sized birds such as ducks, cockatoos, pigeons, finches and fairy-wrens, as well as small mammals, amphibians, reptiles and large insects. They tend to locate their prey by sitting still on a perch until it enters the 'strike distance' or by flushing them out by flying through undergrowth.

During the Goshawks' breeding period (September to December), they either construct a nest out of sticks lined with leaves which is positioned six to 20 metres up a tree, or they occupy an old nest from another raptor species. Two to four plain blue-white eggs may be laid, which hatch after 30 days of incubation. When the young birds are ready to find breeding territories of their own they can disperse distances of up to 900 km.

If you want to find out more about our local birds, NRM Education has two units of work related to birds and several bird ID charts.

Keywords: Lifecycles, features of animals and plants, predator and prey relationship.

References:

- http://www.birdsinbackyards.net/species/Accipiter-fasciatus
- Field guide to the birds of Australia by Graham Pizzey and Frank Knight

The Little Wattlebird lacks the wattles which give this group of birds its name (Photo: Steve Walker)

Not a bird for night owls

Most people around Adelaide would be familiar with the Red Wattlebird, the loud aggressive honeyeater which can be found feeding on the nectar from eucalypts and other flowering trees and shrubs, insects and some fruit. They often chase away smaller birds like the New Holland Honeyeater and Eastern Spinebill.

However, we have another wattlebird in the region that is much less well known. This species, the Little Wattlebird, lacks the wattles which give this group of birds its name but has many shared characteristics, including the aggressive, territorial behaviour.

It is mainly dark grey-brown in colour, with white shafts on each feather, and distinctive blue-grey eyes. The throat and chest are paler grey with white streaks and a reddish patch on the wings, which can be more easily seen when they are outstretched, such as when in flight.

Being a honeyeater, they feed on nectar and have a long, brush-tipped tongue which enables them to lick up the nectar from deep within flowers. They supplement their diet with small insects, which are commonly caught whilst flying.

Also known as the Brush Wattlebird, it is often nicknamed the alarm clock of the bush because its distinctive call is similar to a wooden cuckoo-clock, including the ticking and the bird song. They start calling first thing in the morning and sometimes go on for hours at a time. You can hear a recording of them here.

If you want to find out more about our native bird species, download our identification charts and other resources here.

Reference:

- http://www.birdsinbackyards.net/species/Anthochaera-chrysoptera

Australian Pelicans often work cooperatively [Inset: the spectacular colour change of the bill during breeding] (Photos: Steve Walker)

Splitting the bill - cooperative feeding and flight

The Australian Pelican, *Pelecanus conspicillatus*, is the largest of the eight pelican species, reaching a maximum length of 1.9 metres, with a wingspan up to 3.4 metres. Its 50 cm bill which can hold 13 litres of water is the largest of any bird species.

Many would also argue that it is the most attractive of all the pelicans, especially during the breeding season when the front half of the pouch changes to a bright salmon pink and the skin in the throat area develops a cobalt blue band, with a blue or purple stripe running midway through the pouch. The bill is serrated inside and this, together with a small hook at the tip, allows the pelican to hold onto slippery fish.

Unlike many water birds which take flight by running rapidly across the surface of the water one foot in front of the other as they flap their wings, pelicans hop across the water or land moving both legs together to gradually gain speed. Their enormous wings produce strong slow beats but they are not capable of sustaining the flapping for long periods. Instead, Australian Pelicans use air thermals to reach heights of around 3 km and reach speeds of approximately 56 km/h. Making use of these thermals they are able to soar for great distances, remaining in the air for well over 24 hours with very little effort. When travelling in large flocks they typically fly in a 'V' formation to reduce air drag and increase their range, with the birds regularly swapping positions so that the birds at the tips and front of the 'V' do not become fatigued.

As well as sharing the effort in flying, Australian Pelicans regularly cooperate during feeding. The birds work together to herd fish or other prey into shallow water or into a concentrated mass, where they can be easily scooped up.

February 2 is World Wetlands Day**. Why not find out more about Australian Pelicans and other local wetland birds using our** identification charts and teacher information pack**?**

One of our charismatic local wetland birds (Photo: Steve Walker)

Have you gone off the rails?

You're probably familiar with our local birds the Purple Swamphen, Eurasian Coot and Dusky Moorhen which are commonly seen around rivers, lakes and wetlands, but you might be less familiar with another bird from the same family, the Buff-banded Rail.

These medium-sized birds are actually widespread and considered common throughout Australia, New Zealand and other parts of South-East Asia and the Pacific, but they tend to be very secretive and will dash for cover if they are disturbed. Despite this, they are not particularly shy and will happily go about their business if they don't feel threatened. In fact, it is not unusual for them to scavenge near picnic or refuse areas and even become fairly tame once they become accustomed to you.

They are omnivores, feeding on a range of food items including crustaceans, shellfish, insects, worms and other invertebrates, carrion, seeds, fruit and other vegetable matter.

They are fairly easy to identify and can be distinguished from the other rails and crakes in the region by their grey supercilium (eyebrow), chestnut brown head, and the orange-brown or buff band across the chest. The chin and throat are grey, with the rest of the undersurface having black and white bars. The wings and back are brown with black and white flecks.

As with the Purple Swamphen, the Buff-banded Rail constantly flicks its raised tail as it slowly walks around, giving it a quite comical appearance. They can also put on quite a bit of speed when hunting or scurrying for cover, but rarely fly. They are charming birds to watch so, if you have the privilege of encountering one in the wild, sit quietly and be entertained as they search for food in the reeds and along the water's edge.

If you're interested in our local water birds, you might like to download our wetland birds identification chart and teacher information pack.

Bar-tailed Godwit in non-breeding plumage (Photo: Dick Daniels)

Godwit – long distance record holder

The Bar-tailed Godwit is a large wader with an upturned bill which has a dark end and pinkish base.Its preferred habitats include intertidal sandflats, mudflats, estuaries, inlets, harbours, coastal lagoons and bays. It feeds on molluscs, crustaceans, insects, worms and some plants. It is one of around 37 species of migratory waders that visit Australia's coastline every summer, returning to breed in Russia, the north of Scandinavia or north-west Alaska during our winter. In 2007, Bar-tailed Godwits that left New Zealand were tracked by satellite flying to the Yellow Sea in China, a distance of 11,026 km in actual flight (9,575 km direct) which they completed in roughly nine days. This is the longest known non-stop flight of any bird. Interestingly, not all Godwits migrate to the southern hemisphere in the northern winter, but those that come to South Australia mainly occur from Lake Alexandrina, north along the Gulfs and all the way across to Denial Bay near Ceduna in South Australia. The Adelaide International Bird Sanctuary, the Onkaparinga Estuary in the Gulf St Vincent and the Coorong are all important areas for this species.

The biggest threats to the Godwit and other migratory waders are habitat loss, degradation and disturbance. Hunting of wading birds in China is also a threat. It is important that we protect their habitats in both hemispheres, including the flight path habitats where they feed and rest.

Australia has signed international agreements on migratory birds with the countries that these species travel through and migrate to. In particular, Australia is a member of the Partnership for the Conservation of Migratory Waterbirds and the Sustainable Use of their Habitats in the East Asian-Australasian Flyway (Flyway Partnership). The aim of this partnership is to protect habitat for these birds.

References

- Onkaparinga Estuary Information Package - Department for Environment and Heritage
- Shorebird Management and Conservation - A report prepared by Peri Coleman & Faith Cook, Delta Environmental Consulting for Adelaide & Mt Lofty Ranges Natural Resources Management Board
- Species Profile and Threats Database – Limosa lapponica — Bar-tailed Godwit

Australian Darters are great supporters of solar panels (Photo: Steve Walker)

Solar powered or wind powered?

You're probably familiar with cormorants, shags and darters which sit with their wings stretched out after they've been diving for fish. It's a long held belief that they do this to dry their feathers because they don't produce oils to keep themselves dry like ducks and other water birds. However, it is now known that it is the microscopic structure of the feathers rather than oil that mainly dictates how waterproof the wings are. The reason these birds sit with their wings outstretched depends on their species.

For example, with cormorants the length of time a bird holds out its wings depends on the amount of time it has spent underwater and the wind speed when it is wing stretching. Cormorants sit into the wind and when the wind is strong they hold their wings out for shorter periods than when there is very little wind. They also hold out their wings longer when they have spent more time diving. Success at catching prey makes little difference to their wing stretching, but rainfall reduces it. This all suggests that the main aim of their wing stretching is to dry their wings.

However, with darters, like the Australian Darter pictured above, wing stretching seems to be related more to increasing their metabolic rate to help digestion, than it does to help dry their wings. Darters tend to have a low metabolic rate and easily lose heat from their bodies, so they wing stretch more when it is cool, orienting their backs towards the sun to warm up.

So Australian Darters are solar powered and cormorants are wind powered (I wonder if they celebrate Global Wind Day), both making good use of renewable sources of energy rather than relying on oil!

If you're interested in our local water birds, you might like to download our wetland birds identification chart and teacher information pack.

References:

- https://www.independent.co.uk/news/science/crucifixion-of-the-cormorant-1582972.html
- https://web.stanford.edu/group/stanfordbirds/text/essays/Spread-Wing_Postures.html

The smallest species of penguin in the world (Photo: Steve Walker)

Keeping an eye on Little Penguins

Wednesday 11 July is World Population Day, when we focus our attention on the urgency and importance of population issues. The Little Penguin is one native species whose population is decreasing.

The Little Penguin is the smallest species of penguin in the world, averaging just 33cm in height, so often called the 'Fairy Penguin'. They are very well adapted to the sea and spend about 80% of their lives there, swimming and searching for food. They are distinctly blue with a white underbelly, streamlined bodies, wings used as flippers and feathers distributed densely over their bodies. When not at sea they return to rest in their nesting burrows where they breed and raise chicks.

The Little Penguin population faces a range of threats including coastal and marine habitat degradation, pollution and nest disturbance by people, pets, light and sound. Other threats include entanglement in fishing nets, changes in food availability, predation from domestic and feral animals (such as rats and foxes), and from native animals (such as seals and sharks).

To improve protection of our local Little Penguin populations, research is taking place to determine specific causes of death and to better understand their overall health and the hazards that they face.

Additionally, nest sites and breeding success are being monitored by penguin ecologists, including with the use of motion-activated cameras. Watch the YouTube video to discover more about the Little Penguins conservation project or take a look at the 'nest cam' photos on facebook!

References:

- http://www.birdlife.org.au/bird-profile/little-penguin
- https://penguinfoundation.org.au/about-little-penguins/

The male Emu incubates the eggs and raises the chicks (Photo: Steve Walker)

Flightless, but fast

Found only in Australia, the Emu (*Dromaius novaehollandiae*) is the second tallest bird in the world, reaching up to 2 metres and covered with bushy grey-brown feathers except on the neck, head and long powerful legs. Even though they can't fly, Emus make up for it with their running prowess. Each foot has three forward-facing toes, which is an adaptation for running, and they can reach up 50 km/h with a stride of up to 3 metres.

Another unusual trait of this iconic bird is that the male Emu solely raises his chicks. After the green eggs are laid by the female, the male will incubate the eggs without drinking, feeding, defecating or leaving the nest. Once hatched the striped chicks continue to be looked after by the male until around 6 months old.

Emus feature prominently in Aboriginal stories, dances and culture. They're also the subject of astrological mythology (the Emu constellation) and other creation stories. According to Aboriginal legend, Emus were creator spirits that used to fly and look over the land. They were also an important food source for Aboriginal people and their fat was used for oil, their bones for knives, tendons for string, and feathers for ceremonial adornments.

Emus are omnivorous eating a variety of fruits, seeds, flowers, shoots, insects and other small animals. Like other birds, they swallow stones to help grind up food in their gizzard. These birds play an important role in the ecosystem as seed dispersers for many low growing plants over wide areas. Even if you don't see an Emu, there are ways to tell if one is nearby; look for emu poo! Depending on what it has been eating, the poo could resemble a cowpat – wet and dark green - or a round or small brownish pyramid with lots of visible seeds. Another sign that they are around is the amazing deep, booming, drumming sound they make as you walk through the bush.

Emus have very few predators but they are threatened by habitat loss and fragmentation, and vehicle collision.

To investigate habitat quality at your school, preschool, local park or reserve, or even in your own backyard, download our terrestrial habitat teacher information pack.

Silvereye feeding chicks (Photo: benjamint444, Wikipedia)

Silvereye; a sterling bird

The Silvereye (*Zosterops lateralis*) is a small, olive-green and grey bird with a conspicuous white circle around the eye. Despite their small size and adult weight of just 10 grams, they have amazing stamina and are capable of migrating 1600 km in search of favourable food conditions. They are an adaptable bird capable of colonising new habitats and while they are native to our region they are also found in the South Pacific, Asia and Africa.

Silvereye migration patterns are complicated, because some individuals decide to stay put during cold weather, while others undertake enormous journeys. One such example is the Tasmanian Silvereye, with participating birds making the journey across Bass Strait to mainland Australia. Some individuals fly all the way up the east coast to northern Queensland; others may fly west into South Australia. One theory for the migration across the water is that the behaviour started when the land bridge between Tasmania and the mainland existed and some birds have continued making the journey even though Bass Strait flooded 8000 years ago. Enough birds return to Tasmania to pass on the migration genes to their offspring. Interestingly, Silvereyes also occur in New Zealand, but only since the 1830s, probably after birds migrating to mainland Australia were blown off course.

Silvereyes breed in spring and early summer, making a tiny cup nest out of grass, moss, and hair, bound together by spider webs. In order to attract these birds to your school or home, growing dense shrubs that offer protection from predators will make the area more attractive to them and other small birds. Providing plants that produce flowers and nectar throughout the year will also ensure a constant food source.

If you're interested in our local birds, you might like to check out our selection of identification charts, information packs and other teaching resources.

Keywords and phrases: Weather; Plants provide shelter; Adaptation; Seasons; Migration; Living things live in different places; Living things depend on each other; Features of animals and plants

When viewed in good light the feathers of the Glossy Ibis show their lustrous green and purple gloss (Photo: Steve Walker)

A rare but culturally significant visitor

August 9 is International Day of the World's Indigenous Peoples, which is a good time to look at a bird which has strong cultural significance through the Tjilbruke Dreaming for the local Kaurna, Ramindjeri and Peramangk peoples.

The Glossy Ibis is the smallest and rarest of the ibises found in Australia but it has a wide distribution globally; including parts of Asia, the Caribbean, eastern Central America, and most of central and southern Africa. This large range means it is listed as Least Concern in the IUCN Red List of Threatened Species and considered secure in South Australia, however populations have been on the decrease.

Although it is much more common in the north of Australia, the Glossy Ibis is a nomadic species which is occasionally encountered in the Adelaide and Mount Lofty Ranges region, particularly in the summer months.

From a distance its feathers appear to be dark brown or black but when seen up close in good light, the metallic green and purple lustre, which gives the bird its name, can be seen on the wings. During the breeding season the facial skin between the bill and the eyes turns blue-black, with a distinctive pale-blue edge. Outside of breeding season the wing and body feathers are a much duller dark brown, with the head and neck feathers having dense white streaks.

The Glossy Ibis feeds upon a range of aquatic invertebrates, frogs, lizards and fish by probing into mud with its long, curved bill, which has touch sensors, allowing the ibis to detect prey hidden in the mud. They generally require habitats with shallow water, including mudflats alongside rivers, well-vegetated wetlands and lagoons.

If you're interested in our local water birds, you might like to download our wetland birds identification chart and teacher information pack.

References:

- http://datazone.birdlife.org/species/factsheet/glossy-ibis-plegadis-falcinellus
- http://www.birdlife.org.au/bird-profile/glossy-ibis

The Red Wattlebird in a cherry tree (Photo: Mick Stephenson, Wiki Commons)

What in the world is a wattle?

As backyard sizes decrease and we see a densification of housing within Australian cities and other effects of human activity, some animal species thrive whilst others no longer have their needs met and are forced to move elsewhere.

The animal species that tend to survive changes to their environment are those that can eat a variety of food and tolerate or prosper from new food and shelter sources. Species that are able to source food and shelter in a variety of ways and from a variety of sources are called 'generalists'. Generalists tend to out-compete specialist feeders and, as a result, we are seeing more generalist species within metropolitan Adelaide.

One such generalist is the Red Wattlebird. This bird is easy to identify due to its large size, territorial nature and red 'wattles' or skin flaps on its neck.

Red Wattlebirds are the largest of the honeyeaters found on mainland Australia and will aggressively defend food plants from other honey eaters. As they tend to bully other honeyeaters away from rich sources of food it is common to see Red Wattlebirds duelling with Noisy Miners or New Holland Honeyeaters for access to fruit or nectar trees.

The Red Wattlebird supplements its diet with insects caught either in flight or on leaf foliage but it prefers backyards with a variety of fruit and nectar plants.

Why not use our identification charts to identify which birds you have in your school or garden and then take action to increase the food and shelter available to them?

A Diamond Firetail collecting material for its nest (Photo: Steve Walker)

Have you spotted these finches?

Friday 7 September is National Threatened Species Day - a day to raise awareness of plants and animals at risk of extinction. The date commemorates the death of the last known Thylacine in 1936 at Hobart Zoo. It is not all doom and gloom though as the day provides an opportunity to celebrate the amazing work that is being done by passionate conservationists, researchers and community volunteers to preserve threatened species.

A threatened species worth highlighting in our region is the Diamond Firetail, a very distinctive and stunningly coloured finch. It has a mix of ash brown, grey and white with a black band, including areas dotted with white spots, along with a spectacular crimson rump. It is endemic to south-eastern Australia, being found from central Queensland to the Eyre Peninsula. It resides in a wide range of Eucalypt dominated vegetation communities with grassy understoreys. These include woodland, forest and mallee. In the Adelaide and Mount Lofty Ranges its preferred broad vegetation type is grassy woodland.

As with numerous woodland bird species, Diamond Firetail numbers have declined over most of their historical range because of vegetation clearance, habitat fragmentation and degradation, invasion of exotic grasses and illegal trapping. As a result it is now rated as Vulnerable at both a State and regional level. If you are lucky enough to see one it could well be hopping around on the ground feeding on fallen seed, or taking seed directly from plants. It occasionally also eats insects and their larvae.

Diamond Firetails build a domed nest with a long entrance tunnel constructed of long pieces of interwoven green grass. Nests are often located in the protection of dense foliage of trees and shrubs. For the ultimate protection some even build a nest into the base of the large stick-nest of a bird of prey, thereby using these raptors to ward off predators.

If you are interested in learning more about the birds of the Adelaide and Mount Lofty Ranges check out the range of bird related resources that we have available on our website.

The stunningly beautiful and vibrant Rainbow Bee-eater (Photo: Steve Walker)

Flying north isn't just for grey nomads

The upcoming National Recycling Week, 12 to 18 November, is a great time to audit your school's resource (waste) management systems and see if your provider offers options that are more economical and ecologically sound. One aspect of waste management that is often neglected is energy. By incorporating the study of energy students can learn about multiple sustainability themes because the transfer, use and loss of energy can link topics including waste, transport and ecology.

Energy is essential for survival and birds such as the Rainbow Bee-eater use significant amounts in flight, particularly when flying at high speeds or over great distances. Birds also use energy to stay warm. The body temperature of birds sits a couple of degrees above that of humans, so the energy required to maintain this higher temperature requires them to locate and ingest more food or find other methods of keeping warm. This is one of the reasons some bird species choose to avoid the southern Australian winter, flying north to warmer areas and richer hunting grounds.

The stunningly beautiful Rainbow Bee-eater, easily recognisable due to its colouration, beak shape and flight pattern, is commonly found in the tropical and sub-tropical zones of northern Australia, Papua New Guinea and Indonesia during the winter months and across Australia at other times of the year. It can be seen throughout South Australia, including the Adelaide urban fringe and the Adelaide Hills, Barossa Valley and Fleurieu Peninsula. It creates a tunnel with a nest chamber, often using abandoned mine sites, golf courses and riverbanks where the mud and sand has been eroded.

As the name suggests, Rainbow Bee-eaters are skilled invertebrate catchers, targeting larger prey such as moths, dragonflies, bees and butterflies. Prey is caught on the wing, meaning that they catch prey whilst in flight.

References:

- www.birdlife.org.au/bird-profile/rainbow-bee-eater
- www.birdsinbackyards.net/species/Merops-ornatus

The distinctive Pied Oystercatcher (Photo Glen Fergus, Wikimedia)

Molluscs for dinner? It's a shore thing

This month we have been celebrating the Adelaide Shorebird and Dolphin Festival. You may not have realised that the South Australian coastline plays host to a wide variety of shorebirds- some resident (living in one place all year round) and others migratory (landing here during the warmer months after flying for long periods, often all the way from the northern hemisphere).

The Australian Pied Oystercatcher, *Haematopus longirostris*, is one of our resident species. A shy bird by nature, it is quite distinctive because of its bright scarlet legs, bill and rings around its eyes. It is found across almost all coastal areas of Australia, and prefers sandy and shell grit or pebble beaches, sandbanks, mudflats and occasionally more rugged rocky coastlines.

One of the interesting features of this species is its specially adapted bill, which is long with a rounded end. It uses this to prise apart molluscs and crustaceans. It can use the end of its bill to hammer at hard outer shells of these animals and get to the flesh inside. It also likes to eat insects and worms it finds while wading in the mud.

Sadly, numbers are declining and there are thought to be as few as 10,000 Pied Oystercatchers left in Australia. Loss of landing and feeding habitat, due to coastal disturbance and pollution, are the biggest threats to this species; yet another story showing why marine debris and litter along our beaches is such a huge problem. Next time you're visiting the coast, why not take three for the sea?

If you would like to further explore the topic of shorebirds and their habitat and adaptations, you can find a range of resources on our plants and animals page.

Keywords: adaptation; habitat loss; effect of pollution; migration

References:

- www.naturalresources.sa.gov.au/adelaidemtloftyranges/plants-and-animals/native-plants-animals-and-biodiversity/native-animals/birds/shore-birds-project
- www.birdlife.org.au/bird-profile/australian-pied-oystercatcher

A male Golden Whistler (Photo: Rob Wallace)

Variety is the spice of life

The Golden Whistler (*Pachycephala pectoralis*) is commonly considered to have one of the highest numbers of subspecies of any bird.

They are common in dense woodland habitat in Australia and are also found in Indonesia, Fiji, New Guinea and the Solomon Islands. As they vary in body size, call, plumage and behaviour across their range some people argue that there are multiple species, whereas others consider there to be one species with 70 geographical variations from as many as 59 subspecies.

Geographic variation is an inevitable result of evolution because plants and animals adapt to the particular place and conditions they live in. It can be hard to decide if these variations are different enough to consider them a subspecies, and if we split a species into too many subspecies it makes the taxonomic classification system messy and complicated. The use of DNA sequencing is one way of deciding how many species or subspecies exist, but it is currently a very expensive process, so the debate continues.

What is agreed is that the male Golden Whistler has stunning plumage; a yellow or golden chest, olive green wings, black head and white throat. The female, in comparison, is very dull with brown and olive green plumage. They have a beautiful call that can be heard from quite a distance, and birds are often seen sitting alone in a tree.

Both the male and female are involved in raising the young and building a nest composed of twigs, grass and bark, wound together with fine grasses and spider webs.

Key words: classification and adaptation.

References:

- www.birdlife.org.au/bird-profile/golden-whistler
- www.theguardian.com/science/grrlscientist/2012/feb/25/4
- www.zmescience.com/other/feature-post/difference-species-subspecies/

A White-winged Chough in a Barossa vineyard defending its chick (foreground) with a threat display (Photo: Don Helbig)

Vignerons are choughed to bits

Birds are traditionally seen as pests in agricultural settings, with reputations for damaging crops, but in our grape-growing regions the White-Winged Chough (*Corcorax melanorhamphos*) is increasingly being welcomed by vignerons with open arms.

This is because these gregarious birds have learned to adapt to vineyard conditions, moving back and forth between patches of woodland and adjacent vineyards where, much to the delight of savvy viticulturists, they account for countless earwigs and other bugs. Choughs are attracted to the straw mulch layer at the base of the vine row, where they scratch and peck away like chooks with their beaks and claws to get at the earwigs.

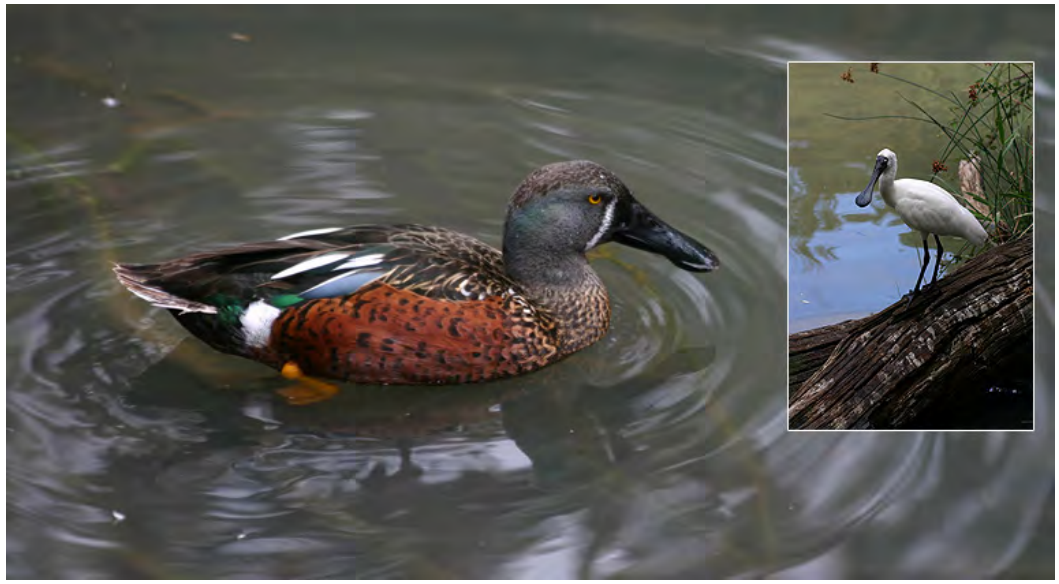
So here we have a mutually beneficial relationship with the choughs feasting on the earwigs in the straw mulch layer, and the vigneron benefitting from having a natural pest control agent fly in and fly out on silent wings. This is a wonderful example of how wildlife is adapting to man-made environments, and even better news is that chough numbers seem to be on the increase in the Barossa.

White-winged Choughs live in social clans of about seven to ten individuals and they defend their nest territory during the breeding season with 'wing-waving' displays. The clans normally consist of only one breeding pair; the others are the offspring from previous years, some of whom may have been kidnapped from other clans. Birds take four years to reach breeding maturity, remaining with the group during this time to help with nest building, incubation and feeding of the chicks.

If you want to learn more about our local bird species, why not download our units of work, information packs or ID charts**?**

References:

- www.birdsinbackyards.net/species/Corcorax-melanorhamphos
- www.birdlife.org.au/bird-profile/white-winged-chough



The attractively coloured male Australasian Shoveler and [inset] a Royal Spoonbill (Photos: Steve Walker)

When is a spoonbill not a spoonbill?

When it's an Australasian Shoveler; an attractive dabbling duck that feeds on crustaceans and other aquatic organisms by filtering them from the water with the aid of small grooves on the sides of the beak. These birds can be found inhabiting a wide variety of lakes, wetlands, dams and other inland water bodies throughout much of Australia and New Zealand.

They were historically placed in the genus *Anas*, with many other duck and teal species, but recent genetic research has resulted in them being moved into the genus *Spatula*, so they are now classified as *Spatula rhynchotis*. The word spatula is an ancient Latin word meaning a broad, flat tool or weapon. The species name, *rhynchotis*, means 'of the beak or bill'. So their full scientific name means 'having a broad, flat bill'.

Spoonbills, on the other hand, are in the genus *Platalea*, referring to their broad, plate-like bill. Interestingly, our use of the word spoon for an eating utensil comes from an old German word, spon, which was a wooden spatula. So a Spoonbill is a bird with a bill like a spatula.....just like an Australasian Shoveler!

Australasian Shovelers are sexually dimorphic, meaning the males and females look quite different. Females are mottled brown all over, with a dull brown beak and eyes, and brown-orange legs. For most of the year, males have a distinctive blue-grey head and neck, yellow eyes, a white crescent at the base of their black bill and bright orange legs. They have mottled brown and white chest feathers, chestnut wings and a white patch at the base of the tail. Outside of breeding season, they appear more like the females.

If you're interested in our local water birds, you might like to download our wetland birds identification chart **and** teacher information pack**.**

References:

- https://www.etymonline.com/word/spoon
- https://en.wikipedia.org/wiki/Spatula_(genus)
- http://www.birdlife.org.au/bird-profile/australasian-shoveler

New Holland Honeyeaters are found throughout most of Southern Australia (Photo: Steve Walker)

It's all there in the name

In 1790, the New Holland Honeyeater, *Phylidonyris novaehollandiae*, was one of the first birds to be scientifically described in Australia, so it's not surprising that it has both a species name and a common name that refers to New Holland, as Australia was known at the time.

The name of the genus, *Phylidonyris*, is also very descriptive of this energetic and charismatic bird. The name comes from a combination of Philedon (itself made up of the Greek words *phileo* and *hedone*, meaning 'to love pleasure') and *Cinnyris* (which is the genus of Australian sunbirds – honeyeaters and sunbirds were originally placed in the same family).

Being honeyeaters, these birds feed mainly on nectar from trees and shrubs such as banksias, eucalypts and grevilleas, but they also supplement their diet with fruit, insects, spiders and other invertebrates. Perhaps a sugar rush explains why they're always active, flitting from flower to flower and noisily chasing away other birds.

Being the hedonists that they are, New Holland Honeyeaters often party in large groups; feeding together and engaging in noisy displays.

They are very common birds, being found across much of southern Australia, from north of Perth in Western Australia, around to Brisbane in southern Queensland. They can easily be distinguished by their white eyes, ear patch and facial tufts, black and white streaked feathers, large yellow wing patch and yellow sides on the tail.

If you want to learn more about our local bird species, why not download our units of work, information packs or ID charts?

Keywords: Features of animals and plants; Classification; Adaptation; Lifecycles; Food webs

References:

- http://www.birdlife.org.au/bird-profile/new-holland-honeyeater
- http://what-when-how.com/birds/new-holland-honeyeater-birds/

The striking Straw-necked Ibis (Photo: Steve Walker)

Don't call me a bin chicken!

Unlike its more common cousin, the Australian White Ibis, which is is an opportunistic scavenger often seen around city landfill bins, a pass-time that has earnt them the nickname of 'bin chicken', the Straw-necked Ibis is a much fussier eater. When it comes to feeding time, it prefers to feast on invertebrates such as grasshoppers, locusts and yabbies. In fact, they are sometimes lovingly called the "farmer's friend" because of their fondness for grassland insects.

This large wetland bird has the distinctive long down-curved black bill of ibis species, which is used to probe for food, but what distinguishes it from other ibises is the straw-like neck feathers, hence its common name. The Straw-necked Ibis is a strikingly colourful bird with a glossy blue-black back and wings that have a metallic purple, green and bronze sheen.

Widespread across much of Australia, it prefers wet and dry grasslands, pastures, croplands and wetland habitats. It is a vagrant to Tasmania and is also found in Indonesia, New Guinea, Norfolk Island and Lord Howe Island. Long distance travel is essential when you live in one of the driest continents on earth and, like other water birds, the Straw-necked Ibis can travel great distances in search of suitable freshwater habitats. The longest recorded movement of an individual Straw-necked Ibis was from south-western WA to south-eastern Queensland, a distance of well over 3500 kilometres. Ibises travel over distances as part of regular seasonal movements, but also in response to local environmental conditions.

The loss of natural habitats, particularly wetlands, pushes our native species further into suburbia in search of food and shelter. This is why we now see Australian White Ibises in such large numbers in our cities, and is how they earned the nickname bin chicken. However, like Straw-necked Ibises, they are also an asset on farms, eating insects and other pest species.

Find out what you can do to help preserve and increase our natural environments so our wildlife can remain wild, by downloading our wetland birds identification chart and teacher information pack.

Australian Reed Warblers are generally heard before they are seen (Photo: Guy Draper)

Not all migratory birds are shorebirds

In south-eastern Australia, the Australian Reed Warbler (*Acrocephalus australis*) is a migratory bird that flies in every September from northern Australia and New Guinea, spending summer breeding in local riverbeds and wetlands, before heading north again in March.

Wetland plants such as the Common Reed (*Phragmites australis*) and Bulrush (*Typha domingensis*) on creeks, rivers, dams and inland springs are core habitat, providing nesting sites as well as shelter and access to food (insects).

Australian Reed Warblers are found in wetlands throughout Australia as well as New Guinea and across to south-eastern Africa. Originally classified as the Clamorous Reed Warbler (*Acrocephalus stentorius*), it is now officially recognised as a separate species.

A cheeky but shy bird, the Australian Reed Warbler has a distinctive high-pitched melodious call "twitchy-twitchy-twitchy-quarty-quarty-quarty" and is usually heard before it is seen.

Go down to your local riverbank over the spring and summer months to hear them calling and see them playing hide-and-seek with you. Wild migratory birds such as this connect us with other distant places and can make us reflect on how they depend on local habitat for their continued existence.

If you want to learn more about our local bird species, why not download our units of work, information packs or ID charts?

Reference:

- http://www.birdlife.org.au/bird-profile/australian-reed-warbler

The Pacific Gull with its distinctive bill (Photo: Steve Walker)

Not your average sea gull

Friday 28 June is Red Nose Day. A distinctive bird with a large, red-tipped, yellow bill which can be found in South Australia is the Pacific Gull (*Larus pacificus*). It is Australia's largest gull and, despite its name, is much more common on land around the Southern and Indian Oceans. So why is it called the Pacific Gull? It was first described and named in 1801 from a drawing of a bird in New South Wales on the Pacific coast. They can be found in each state in Australia (excluding the Northern Territory and ACT), although they are much more frequently observed around the coasts of Victoria, Tasmania, South Australia and southern Western Australia.

Unlike the common Silver Gull, Pacific Gulls have a black or dark grey back and the upper wings are black with a white edge. The head and undersides are white, and the tail has a black band. Juveniles are dark brown in colour.

They are generalist feeders, happy to eat a range of marine invertebrates as well as small fish, carrion, fruit and even eggs and small birds. They have been known to catch shellfish and sea urchins then fly up to a great height before dropping them onto the rocks or roads to break them open. Although they can be found feeding in rubbish tips, they are much less aggressive than Silver Gulls and prefer to feed on the coast.

Pacific Gulls breed in colonies on islands, making a nest of either a scrape in the ground, which may be bare or lined with gravel, or a neat nest made from grass, sticks and seaweed.

If you're interested in our local water birds, you might like to download our wetland birds identification chart and teacher information pack.

References:

- Birdlife Australia
- Dutch Birding
- Atlas of Living Australia

Eurasian Coots have distinctive, partially-webbed toes (Photo: Steve Walker)

Water skating birds

The Eurasian Coot, *Fulics atra*, is a black bird recognised by its snowy white bill and forehead shield. It has striking red eyes and long, strong toes with partial webbing. Perhaps you've heard its 'kow-kow-kow or 'kwok' call or spotted one skating across the surface of a pond or river as it takes off to fly.

As the common name suggests, Eurasian Coots can be found across Europe as well as in Australia, Asia, northern Africa, New Zealand and parts of New Guinea.

They mainly feed on plants and can dive underwater for up to 15 seconds in order to find waterweeds to eat. By squeezing air out of their feathers to become less buoyant, they are able to go as deep as 7 metres. As well as feeding underwater, Eurasian Coots also graze on vegetable matter on land and at the water's surface, and will occasionally eating insects, worms or fish.

In Australia they breed during winter and spring, when they can become territorial and be rather aggressive towards other birds. While harmless to humans, they have been known to seize the nesting sites of other birds, such as ducks, for their own eggs.

If you'd like to know more about other local water birds, check out our wetland birds identification chart. You can also monitor birds in your local wetlands using our Engaging With Nature Wetland Birds teacher information pack, or in your school grounds with Looking at habitat diversity through birds – a learning sequence. Have fun exploring!

Reference:

- http://birdlife.org.au/bird-profile/Eurasian-Coot
- https://www.backyardbuddies.org.au/fact-sheets/eurasian-coot

Noisy Miners are not introduced, they're a native honeyeater (Photo: Steve Walker)

Canary in the coalmine?

Many people think the Noisy Miner is an introduced bird, but it is actually a native honeyeater, easily identified by its black head and distinctive yellow beak. It is commonly seen strutting and bobbing around on lawns and parklands. When disturbed, a two-footed push-off into flight mode propels it to the safety of a nearby perch. Noisy Miners can be helpful, as they love to eat the little bugs and other insects that get up to no good in your veggie garden, but they are an example of an 'increaser' species; there's more of them around now than before European settlement, despite honeyeaters generally being on the decline. So why might this be the case? Noisy Miners have an aggressive territorial nature, being able to boss other species around to defend their feeding territory and gain a monopoly over food sources. They hunt in packs chasing other birds, possums and even cats away. "The Noisy Miner's unpleasant trait of directing loud, concerted aggression against almost every other bird unfortunate enough to enter its territory makes it unique among birds."[1] In urban areas they have been observed feeding in gum trees more than other species of honeyeater. The typical parkland environment we have created since European settlement, with scattered gums and scarcely any shrub layer, favours Noisy Miners. They are also generalist feeders; they don't just feed on nectar, they are omnivores, meaning that they survive on both plant and animal matter, mainly feeding on insects. So what can we do to tip the scales back in favour of the declining honeyeaters? Since Noisy Miners love wide open spaces, the more densely vegetated your backyard, the less likely they are to claim the space for themselves. So plant understorey species, including dense, nectar-bearing hakeas and prickly wattles, which provide safe cover and long tubular blossoms that are more useful to smaller honeyeaters. For more information, see our comprehensive local bird resources including Birds unit of work.

References:

1. Pizzey, G. (2000). The Australian bird-garden. Pymble, N.S.W.: Angus & Robertson, p.146.
2. Daniels, C. et al (2005). Adelaide: nature of a city: the ecology of a dynamic city from 1836 to 2036. Adelaide: BioCity Press.
3. Centre for Urban Habitats, South Australia.

Masked Lapwings are common inhabitants of grassy areas around Adelaide (Photos: Steve Walker)

A mask of pretence

Monday 16 September is Plover Appreciation Day; a day dedicated to raising awareness of threats to ground-nesting plovers around the world. Many of the world's plover species are highly threatened, mainly due to their preferred nesting areas (such as beaches and grassed areas) being in demand for sport and other recreation activities. As well as reducing the amount of habitat available for them, we sometimes impact on their survival when we accidentally damaged their well-camouflaged eggs and hidden nests.

The plover most commonly encountered around the Adelaide and Mount Lofty Ranges is the Masked Lapwing (*Vanellus miles*), the largest of all the world's plovers; growing to a length of 37 cm, with a wingspan of 85 cm. Unlike most plovers, which rely on camouflage and secrecy, Masked Lapwings use aggressive behaviour to actively defend their territory and nests during the breeding season. This typically involves swooping, or feigning illness or injury to draw a predator's attention away from the nest or chicks. They are sometimes referred to as Spur-winged Plovers due to the black-tipped yellow spurs that project from the wrist (of their wing) and which are used when swooping at predators or intruders. Despite having these spurs, Masked Lapwings usually avoid making contact during the swoops and, as with other plovers, they often try to trick predators by pretending to defend a nest some distance from where the actual nest is located.

There are two subspecies, both found in South Australia; *Vanellus miles miles* (see inset) in northern Australia, Indonesia and New Guinea, and *V. m. novaehollandiae* (main photo) in southern Australia and New Zealand. The northern form is smaller but has a larger mask and longer wattles, and the southern form has distinctive black markings on the collar and sides of the breast.

Keywords and phrases: Predator and prey relationship; Adaptation; Effects of human activities; Features of animals and plants.

References:

- http://birdlife.org.au/bird-profile/Masked-Lapwing

Yellow Spoonbills are found throughout our inland waters (Photo: Steve Walker)

Born with a yellow spoon in the mouth

September 22 is World Rivers Day, so why not spend some time exploring your local waterways? In these environments you might see our two species of spoonbills. They are both of similar size and possess the characteristic spoon-shaped bill, but their diets differ slightly. As a result, the Royal Spoonbill (*Platalea regia*) is normally found around marine environments, whereas the Yellow Spoonbill (*Platalea flavipes*) prefers inland bodies of water, typically wetlands, swamps and lagoons; although they can be found together on occasion.

When feeding, the Yellow Spoonbill wades slowly through the water stirring up mud from the bottom, taking slow, sideways strokes with its bill. It is able to catch small prey including crustaceans (yabbies and shrimp), macro invertebrate (water boatmen and freshwater snails), small fish and some plants.

Nests are usually made from a large collection of sticks gathered in bushes or trees. Typically up to four eggs are laid, with both parents incubating the eggs and feeding the young. They are able to walk from the nest at four weeks old, and can fly from the nest at seven weeks to join the parents nearby for feeding.

If you're interested in our local water birds, you might like to download our wetland birds identification chart and teacher information pack.

References:

- https://birdssa.asn.au/birddirectory/yellow-billed-spoonbill/
- http://www.australianbushbirds.info/infp/platalea_flavipes.html

Red Knots foraging in sand for worms, bivalves and crustaceans (Photo: Gregory Breese/USFWS)

Knot your average bird

Each year about 27,000 migratory shorebirds settle in at Adelaide's International Bird Sanctuary (AIBS) to feed and roost along our rich northern coastline. It's hard to comprehend that these (often) small birds travel such epic distances from the other side of the world. The Red Knot (*Calidris canutus*) migrates each year from its breeding grounds high in the Arctic to Australia – a journey of 15,000 km in flight! Incredibly, they navigate this journey instinctively using the earth's magnetic field to guide them. On arrival they gather in large flocks on tidal mudflats with other wading birds.

Red Knots are speedy on foot, particularly when foraging. They use their specialised short and straight bill to probe the soft sand and mud for food, while walking quickly across the mudflats as they're exposed by the falling tide. They feast on worms, bivalves and crustaceans but will also eat spiders, insects, seeds and shoots. Having an efficient beak design is crucial for migratory shorebirds as they need to bulk up for their return trip to the Arctic. In just a few short weeks, the Red Knot can build up to 30% of its body weight in extra fat stores.

Unfortunately, migratory shorebirds face a perilous journey. Not only do they face biological factors such as disease, predation and having enough energy stores to make the distance, they must also survive human-induced threats. Economic and social pressures lead to threats on the East Asian-Australasian Flyway (the migration route to Australia) such as wetland destruction and change, pollution and hunting.

If you're interested in shorebirds, please download the AIBS Educator Resources from our website.

References:

- http://www.birdlife.org.au/bird-profile/red-knot
- https://www.environment.sa.gov.au/goodliving/posts/2017/11/frequent-flyers
- http://www.birdsinbackyards.net/species/Calidris-canutus

The Magpielark is not the Piping Shrike featured on South Australia's flag (Photos: Steve Walker)

Just larking about

A bird you're highly likely to encounter in your backyard is the Magpielark (*Grallina cyanoleuca*). However, despite its name, is neither a magpie nor a lark. It is actually much more closely related to the Monarchs and other flycatchers.

The Magpielark is distributed throughout most of mainland Australia, with the exception of parts of the inland deserts, but it is rare in Tasmania. Magpielarks have adapted extremely well to human impacts and they are common in both urban and rural areas. While they are predominantly carnivores, feeding on a range of insects, worms, spiders and other small invertebrates, they will sometime scavenge meat and other food discarded by humans.

Because they have such a wide distribution they have acquired many different names, including Peewee, Mudlark, Murray Magpie and Little Magpie. They are often erroneously thought to be the Piping Shrike, the emblematic bird featuring on South Australia's flag, State Badge and Coat of Arms, but the Piping Shrike is actually a stylised version of the Australian Magpie.

The male and female birds can be easily distinguished; males have a black face with a white eyebrow (main photo), whereas the female has a white face with no eyebrow (inset). They usually pair for life and will stay together in the same area if there are sufficient resources. During breeding season they build a mud nest lined with feathers and grass on a horizontal branch. Both sexes rear the young. They may have more than one brood in a year and can become quite aggressive, actively protecting their territory and nest during breeding season.

If you want to find out more about our local birds, NRM Education has units of work related to birds and several bird ID charts.

References:

- http://www.birdlife.org.au/bird-profile/magpie-lark
- http://www.birdsinbackyards.net/species/Grallina-cyanoleuca

White-faced Heron in breeding plumage (Photo: Rob Wallace)

A watcher of water

The White-faced Heron, *Egretta novaehollandiae*, is the most commonly seen heron in Australia, primarily light blue-grey in colour with a characteristic white face. It has a long neck, legs and dark bill. In breeding season, it has long breeding plumage on the neck, breast and back. Herons flying overhead are easily identifiable as they retract their long necks and have dark flight feathers, contrasting their grey wings.

You might spot this water-loving birds at beaches on the sand or on reefs, along creeks and rivers in woodlands, on tidal mudflats and in mangroves, grasslands, or even near fish-ponds, golf courses with water and gardens. It is often seen staring into water watching for prey. It can be found throughout most of Australia, as well as Indonesia, New Guinea, New Zealand, New Caledonia, islands of the Torres Strait and sub Antarctic islands.

The White-faced Heron feeds on a range of prey such as fish, aquatic insects, amphibians and crustaceans. It uses various hunting techniques including raking the surface with its foot to flush out prey, standing and waiting for prey and slowly stalking it. It has good night eyesight which also allows it to forage at night. While it is generally solitary and defend its feeding territories, it sometimes roosts or feeds together in small groups.

It builds a shallow untidy nest of sticks in a leafy fork of a tree, and typically breeds in spring and early summer, laying 3 to 5 pale blue eggs.

To find out about other wetland birds in the region, check out our Wetland birds of South Australia identification chart**.**

References:

- https://australianmuseum.net.au/learn/animals/birds/white-faced-heron/
- https://birdssa.asn.au/birddirectory/white-faced-heron/
- http://animalia.bio/white-faced-heron

A pair of Maned Ducks inspecting a hollow in a gum tree (Photo: Steve Walker)

Mane about town

The Maned Duck, *Chenonetta jubata*, (also known as Australian Wood Duck or Maned Goose) is a widespread, medium-sized water bird found throughout Australia in freshwater wetlands, open woodlands and grasslands. Unlike many species, they have benefited from European settlement, adapting well to modified environments such as farm dams, ornamental ponds, reservoirs, lawns/ovals and golf courses.

The species name *jubata* is from the Latin 'iubatus', meaning maned or crested, and refers to the distinctive mane of feathers of the back of the male's head which gives this bird its common name.

Maned Ducks are sexually dimorphic: the male has the mane, a dark brown head, and black lower belly and undertail; the female has a paler head with white stripes above and below the eyes, and a white lower belly and undertail. The female also tends to have a more speckled body.

This bird is often described as being goose-like and the genus *Chenonetta* comes from the Greek words 'khenos' and 'netta', meaning goose and duck respectively. Do you agree that this species is goose-like? What physical characteristics might make it so?

People are often surprised to hear that Maned Ducks nest in tree hollows rather than on the ground or amongst reeds and other aquatic vegetation. The female lays 6–12 eggs and incubates them in the hollow while the male stands guard. Once the ducklings are old enough, the female flies to the ground then calls for them. Even though they are unable to fly, the ducklings jump after her, madly flapping and tumbling to the ground to be with her. Both parents tend the young.

The breeding pair is monogamous, remaining together year after year and often using the same nesting hollow.

Maned Ducks are predominantly vegetarian and are usually observed foraging for grasses and other vegetation on lawns, in paddocks, pastures and other open areas.

Australasian Grebes are excellent swimmes and divers (Photo: Rob Wallace)

A change in the feather

The Australasian Grebe or Little Grebe, *Tachybaptus novaehollandiae*, is a small waterbird found across most of Australia. These birds change their duller feathers for more notable breeding plumage during the breeding season. At breeding time in spring, they have a glossy-black head, a rich, chestnut facial patch from behind the eyes to the back of their head and the patch of skin at the end of their beak also yellows.

Australasian Grebes are commonly found in freshwater ponds and waterways, swimming alone or in pairs. They're excellent swimmers and divers, and you may notice they dive underwater rather than fly, when they feel threatened.

Australasian Grebes typically lay four to five pale, blue-green eggs in a clutch, and may lay up to three clutches in a season. They use vegetation to build floating nests, usually anchored by submerged plants. Young chicks have dark brown down with pale stripes, and can be seen following their parents around or sitting on their mother's back as they swim.

Cleverly, Grebes sometimes feed their chicks their own feathers to line and protect their stomachs from swallowed fish bones, while their tastier diet consists of small fish and water insects, normally caught during deep underwater dives.

To find out about other wetland birds in the region, check out our Wetland birds of South Australia identification chart**.**

References:

- https://birdssa.asn.au/birddirectory/australasian-grebe/
- https://www.birdlife.org.au/bird-profile/australasian-grebe
- http://www.birdsinbackyards.net/species/Tachybaptus-novaehollandiae
- https://haydensanimalfacts.com/2015/10/18/5-interesting-facts-about-australasian-grebes/

Tawny Frogmouths at Anstey's Hill (Photo: Rob Wallace)

A stick, a bird or just April Fool's Day?

What could be more appropriate for April Fool's Day than a creature feature on an animal that looks like a broken tree branch. You may have walked past Tawny Frogmouths many times without ever seeing them. Their brown, russet or silver camouflaged colours and rough bark textured feathers, combined with their ability to stay perfectly still for long periods, makes them virtually invisible; a great way to evade predators.

Tawny Frogmouths, *Podargus strigoides*, are found throughout Australia in a wide range of habitats. They tend to stay in the same territory for many years and can even nest in the same tree.

Tawny Frogmouths are often thought to be related to owls because of their looks but they are actually more closely related to Owlet Nightjars. Although mostly nocturnal they can move during the day but spend most of their daylight hours perched invisibly on low branches of trees. There is debate as to whether they are twilight or night hunters. As they feed in low light, they have a well-developed sense of sight and hearing.

Their main food sources, which are often caught on the wing, are mice and invertebrates, which include bugs, beetles, wasps, spiders, centipedes, millipedes, moths, scorpions, snails and slugs. They also eat reptiles, birds, frogs and small mammals. The bristles around a Tawny's mouth are thought to help protect it from centipedes and the bites and stings of scorpions and other invertebrates. Because car headlights attract insects, Tawny Frogmouths are often hit by cars while chasing prey.

Tawny Frogmouths tend to pair for life, but that does not mean that the male is always the biological father. They build a nest, often on a horizontal forked branch, made of an untidy, loose platform of sticks. Usually they only breed once a year, although sometimes twice in the southern parts of Australia. Both parents share incubation of the clutch of two to three eggs.

References:

- Australian Museum. Tawny Frogmouth
- Kaplan, G 2007. Tawny Frogmouth. CSIRO Publishing, Collingwood, Victoria

Mammals

Southern Brown Bandicoot (Photo: Bertram Lobert)

Trying to stop the bandicoots crashing

Sunday 8 September 2013 is National Bilby Day, which draws the attention of the Australian community to the plight of Bilbies.

Bilbies are large bandicoots which became extinct in South Australia by the 1930's but captive breeding programs and some limited reintroductions have ensured that the Greater Bilby once again has a presence in this state.

Of the eight bandicoot species that originally occurred in SA, only the Southern Brown Bandicoot can still be found naturally here. However, due to many factors, including habitat loss, fragmentation and degradation, it has become a nationally endangered species. Its survival relies on protecting and restoring habitat.

Southern Brown Bandicoots are a medium-sized compact marsupial with small, round ears and a short, pointed snout. They live in the Mount Lofty Ranges, typically in Stringybark Eucalypt woodlands or forests. They require very thick shrubby understorey vegetation for protection from predators.

Bandicoots are omnivores that eat a wide range of invertebrates, small vertebrates, fungi and plant matter; including grasses, moss, clover root nodules and various fruits and seeds.

During the day, they usually shelter in nests consisting of leaf litter and soil mounded into a shallow depression in the ground, sometimes with a hollow nesting chamber. However, if you take a walk along the Waterfall Gully to Mt Lofty track you can sometimes see them foraging in broad daylight.

You can visit some Tammar Wallabies in the Children's Zoo at Adelaide Zoo (Photo: Jeremy Gramp).

Kangaroos, kiwis and conservation

Anzac Day occurs during the upcoming school holidays. It is a day on which we remember Australians who have died serving their country. The date, 25 April, marks the anniversary of the first major military action fought by Australian and New Zealand forces during the First World War.

There are many other examples of Australians and New Zealanders collaborating throughout history, but one particularly interesting one involves one of our Australian native animals.

The Tammar Wallaby was a nocturnal rabbit-sized marsupial that lived in southern Australia, including the Adelaide Plains and Fleurieu Peninsula. We say 'was' because this mainland South Australian population was driven to extinction in the 1920s because of land clearing, hunting by humans and predation by cats and foxes.

However the story does not end there. As luck would have it, in 1870 former Governor of South Australia Sir George Grey introduced Tammar Wallabies to an island in New Zealand where they flourished. So much so that they were causing quite a lot of damage to the local environment.

These NZ wallabies were able to be repatriated back to mainland South Australia, bringing them back from extinction. The location deemed most suitable for reintroduction was Innes National Park at the foot of Yorke Peninsula. After a period of quarantine at Monarto Zoo, the wallabies were released in the park between 2004 and 2008.

Despite some population fluctuations, numbers have stabilised and the wallabies continue to survive on Yorke Peninsula. Monarto Zoo also maintains a captive breeding program.

The management systems now in place will help to ensure that the Tammar Wallaby won't go 'extinct' a second time.

Common Brushtail Possum detected in a nest box with one of our nest box cameras

Playing possum

Most people are familiar with the Common Brushtail Possum; which is Australia's largest possum growing to a weight of about 4.5 kg and a length a 95 cm including tail. But do you realise that Common Brushtail Possums have declining population numbers and are actually now considered rare in South Australia? For some, this is considered a good thing because when possums are active at night they can be very noisy, with hissing and fighting, and thumping across our roofs as if the roofs are their own personal highways. Other people get annoyed by possums living and peeing in their roof spaces, eating their fruit trees and generally causing damage to their gardens. But many others love the interactions they can have with these amazing wild creatures in their own backyards and are more than happy to put up with a little bit of disturbance.

The scientific name for the Common Brushtail Possum is *Trichosurus vulpecula*, which means 'furry tailed little fox', a perfect description for this marsupial with a bushy tail and large, pointed ears. In the wild, Common Brushtail Possums mainly eat leaves, but will also feed on fruit, flowers and occasionally invertebrates and meat. They have a life-span of about 14 years. Major causes of possum population declines include loss of habitat – in particular nesting hollows in large trees – and fatalities caused by vehicle accidents and pet cats and dogs.

If you want to keep possums in your yard, but avoid damage in your attic or roof space, some of the best strategies include sealing up gaps so that they cannot enter your house, and providing alternative sheltering spaces such as nest boxes. Providing alternative food plants or netting fruit trees and vegetable gardens are also effective ways of reducing possum damage in your garden. If you do have nest boxes at your school and would be interested in finding out what wildlife has been using them, why not borrow one of our nest box cameras? These easy-to-use cameras are mounted on an extendable pole and allow minimal disturbance viewing inside the nest box. They also allow you to take photographs or record video which can easily be transferred to a computer.

Find out more about our cameras and other equipment available to loan from our library.

The Kangaroo Island Kangaroo, a subspecies of Western Grey Kangaroo (Photo: Steve Walker)

Paws for thought

Saturday 11 July is World Population Day and the United Nations wants to encourage young people to be empowered in making decisions about their future.

One of Australia's most distinctive animals, the kangaroo, has a unique population adaptation, where it can practice family planning by pausing pregnancy in times of scarce resources. The mother can wait up to 11 months for conditions to improve before giving birth. This strategy, called embryonic diapause, allows almost all species of macropods (the group that includes kangaroos, wallabies and wallaroos) to halt population growth in the face of poor conditions, but also to quickly take advantage of increases in resources, such as after good rainfall. This interesting strategy gives a greater chance of survival for both mother and joey, and can be used as a discussion point for raising awareness of overpopulation and scarce resources with young people.

Interestingly, the most common macropod in the Adelaide and Mt Lofty Ranges region; the Western Grey Kangaroo (*Macropus fuliginosus*), is one of the only macropod species that does not exhibit the embryonic diapause adaptation. Biologists believe this is because the Western Grey Kangaroo breeds seasonally, and is better able to take advantage of predictable winter rains and spring growth, with most joeys being born between September and March. This contrasts with other species, which tend to be more opportunistic – giving birth whenever resources allow.

While Western Grey Kangaroos were previously very common throughout the Adelaide Plains, they are now restricted to a few areas in the Southern Mt Lofty Ranges, notably in Morialta Conservation Park and in flatter, more open sections of the Adelaide Hills. Large mobs of 40-50 animals are frequently found in Deep Creek Conservation Park and in the Fleurieu and Southern Barossa districts.

References:

- http://www.arkive.org/western-grey-kangaroo/macropus-fuliginosus/
- http://www.wombatrise.com/wgk.htm
- http://en.wikipedia.org/wiki/Embryonic_diapause

Lilly, a Gould's Wattled Bat cared for by Adelaide Bat Care.

Batting for our natural pest controllers

About one quarter of all mammal species in Australia are bats, and they are the only mammal that can fly.

Our local species are microbats, so they are rarely seen by anyone other than scientists and people who spend their time crawling around in caves or roof spaces.

If you've never travelled outside of the state, the Grey-headed Flying Foxes in the pine trees opposite the Adelaide Zoo entrance might be the first bats you've ever seen, but they aren't even local. They are megabats that eat nectar, blossoms and fruit. They first arrived in Adelaide in 2010 as part of a mass movement after heavy rains washed out their nectar sources in parts of their normal distribution range from Rockhampton to Melbourne.

In the Adelaide region we have eight common and six rare species of bat. Their size, mobility and nocturnal nature, as well as the limits of technology, make studying their distribution and ecology challenging, so they are not well understood.

Microbats have a diet of insects, and can eat half their body weight or more per night in warmer months, so they help keep ecosystems in balance as well as being wonderful natural pest controllers for us. However, humans are one of their biggest threats. At this time of the year they are in torpor, so if you do come across them please don't disturb or handle them as this can kill them.

Behaviours we can adopt that will protect bats include reducing our use of pesticides, controlling where our pets roam, and saving trees (living or dead) that have hollows as these are critical habitat for microbats.

References:

- Terry Reardon presentation at a Natural Resources AMLR volunteer event, Wittunga
- Adelaide Bat Care
- Australasian Bat Society

Australian Sea Lions on Kangaroo Island; the male has the distinctive blonde mane (Photo: Steve Walker)

Lion around on the beach

The Australian Sea Lion (*Neophoca cinerea*) is one of South Australia's most loved locals, however during the 19th century it was hunted almost to extinction for its leather and oil and is now one of the rarest seal species in the world. Of the 15,000 Australian Sea Lions still in the wild, 85% live and breed in South Australia, with the remaining 15% in Western Australia.

A full-grown male Australian Sea Lion (a bull) has brown or blonde hair and can weigh up to 350kg. Females are ash grey on top with cream underbellies and can weigh up to 100kg. Using their front flippers to prop themselves up, they can then use their back flippers to help them 'walk' on land. The back flippers act as a rudder in the water.

The Australian Sea Lion feeds from the sea floor in depths of 20-100m catching creatures such as octopus, cuttlefish, small rays, and mullet. Being very social animals, when not feeding, they spend their days resting and sunbaking on sandy beaches and rocks.

With a life span between 17 and 25 years, a gestation period of 17.5 months, and adults not reaching maturity until three years (females) and eight years (males), you can see why numbers are dwindling even with numerous breeding colonies.

The biggest threat to Australian Sea Lions is entanglement in marine debris and fishing gear, up to 80 percent of which comes from the land (including rubbish dumped by beach users). Other threats include attack by big sharks (e.g. Great White Sharks), being struck by boats, human disturbance, pollution, and overfishing (reducing their food supply).

References:

- http://www.environment.sa.gov.au/sealbay/australian-sea-lion/frequently-asked-questions
- http://www.naturefoundation.org.au/grants/australian-sea-lions

A Southern Right Whale off the coast of Western Australia (Photo: Gregory Smith)

Not having a whale of a time

The Southern Right Whale, *Eubalaena australis*, is found throughout the Southern Hemisphere and is one of three species of right whale; the others being the North Atlantic Right Whale and the North Pacific Right Whale. All three species were previously thought to be the same, and it wasn't until 2002 that the International Whaling Commission recognised them as distinct species.

Right whales are so named because whalers identified them as the 'right' whales to kill due to their abundant blubber, which they rendered into whale oil, and their baleen, which was used for items that required strength and flexibility, including petticoat, collar and parasol supports; whips; bows; and basketry.

Right whales are easily recognised by the white patches of thickened skin (callosities) which are encrusted with marine lice. Each whale has a unique pattern of these callosities, much like fingerprints or birthmarks.

Southern Right Whales grow to a length of about 18 metres and can weigh as much as 80 tonnes. In fact, they weigh a staggering one tonne at birth. Yet despite their massive size, Southern Right Whales eat some of the smallest creatures in the ocean. Their diet mostly consists of krill and copepods, with a single whale eating approximately one tonne of these tiny crustaceans each day in subantarctic waters.

Right whales were almost hunted to extinction during the 18th and 19th centuries, but their numbers have slowly been increasing since whale hunting was officially banned in the 1930s. However, recent studies of Southern Right Whale populations in New Zealand indicate that the original whale populations were actually much larger than previously thought, meaning populations have only recovered to about 12% of their original size.

Therefore, it will take much longer for the populations to return to normal and the whales may still be under pressure from other factors such as climate change, which is expected to significantly deplete populations of the krill and copepods that they feed upon.

Numbat at Perth Zoo, Western Australia (Photo taken by Martin Pot on wikicommons)

Don't let the Numbat go the way of the Dodo

When Europeans first arrived in Australia, Numbats (*Myrmecobius fasciatus*) were found across the southern part of the continent. Now there are less than 1500 individuals left; mostly as a result of fox predation and habitat destruction. The area around Adelaide would have had its share of these striped marsupials, but they are now locally extinct and on the Red List of Threatened Species put together by the International Union for the Conservation of Nature (IUCN). September 7 is Threatened Species Day, and a good time to think about the creatures most at risk of disappearing forever if we don't act to save them.

Numbats are easily recognised by their distinctive stripes, which helps explain why they are sometimes known as Banded Ant-eaters; though they don't eat ants, instead preferring to munch around 20,000 termites a day! This taste for termites results in Numbats being diurnal, which means they are active during the day. They have to collect termites when temperatures are warm and the insects are out foraging, not hiding in tough-walled mounds. Being diurnal makes Numbats much more vulnerable than their nocturnal marsupial cousins, as many predators such as foxes, birds of prey and snakes are also active during the day.

The only places to see Numbats in the wild are two areas not far from Perth, though there are a number of captive populations that have been reintroduced to areas previously inhabited by Numbats – safely behind protective fences. One of these sanctuaries is at Yookamurra, just two hours from Adelaide, where they have an education program and school camps.

References:

- http://www.numbat.org.au/thenumbat/
- http://www.australianwildlife.org/wildlife/numbat.aspx

Key words: food webs; habitat loss; predator and prey relationship; effects of human activities; effects of introducing new species.

From left: Common Brushtail Possum (Photo: Chris Hall) and Common Ringtail Possum (Photo: Graham Powell). Both species have 'prehensile' tails which wrap around foliage/branches to assist them when climbing

Playing possum

How lucky are we to still have wild marsupials roaming our backyards at night, sharing our urban life-space? What a thrill to be lying snug in bed and hearing their throaty call just outside your bedroom window. They can be a mixed blessing however, as they can thump around on and in the roof and are attracted to our fruit trees and roses. The Common Brushtail Possum is more common than its smaller cousin the Common Ringtail Possum, and is now more common in urban areas than in the wild, as they have adapted well to our domesticated ways. Possums were hunted in past generations for their fur. Aboriginal people used possum skins to make cloaks and keep warm. Common Brushtail Possums have a sweet tooth for gum leaves, flowers and fruit as well as shoots such as rose buds. They will also snack on birds' eggs and insects, and will graze at ground level. They nest in tree hollows and must compete with other wildlife (e.g. kookaburras) for scarce nesting hollows. Being marsupials, possums give birth to live young, usually a single jellybean-sized joey which makes its way into the mother's pouch where it will live for four to five months. The smaller, less encountered Common Ringtail Possums tend to live mainly in the canopy of shrubs and trees, rarely descending to the ground. They build flimsy nests called 'dreys' in dense understorey shrubs. Unlike the Common Brushtail Possums, they are gregarious, living in family groups. Parasitic native Mistletoe plants are prime nesting sites. Common Ringtail Possums are also partial to the flowers and foliage of Dryland Tea-tree (*Melaleuca lanceolata*). They are at risk from predators including foxes, cats and dogs and are killed by cars as well. Generally speaking, the Common Brushtail Possums are the possum species most commonly found in urban areas of Adelaide, whereas Common Ringtail Possums are more likely to be found in the Adelaide foothills and Hills, and Southern Barossa region in areas containing a denser shrubby understorey, rather than just tall trees.

Some possum facts: a female possum is called a 'Jill'; a male is called a 'Jack'; young ones are called 'Joeys'; a group of possums is called a 'passel'; 23 possum species are known in Australia; the Common Brushtail Possum is the most abundant and widely distributed Australian marsupial; Common Brushtail Possums have a naked patch on the underside of their bushy tail which helps them to grip on to branches; the Common Brushtail Possum has a pointed face and pink nose, with long oval ears and bushy black tail; both species use their tails for carrying nesting materials by looping their tails around them.

A typical image of a lazing Koala, highlighting the unusual thumbs and toes (Photo: Steve Walker)

All thumbs and gums

The Koala is one of Australia's best known and most loved native animals, with many tourists (and locals) flocking to cuddle one at zoos and wildlife parks like Cleland Wildlife Park all over the country. Koalas are extremely well adapted to life in the gum trees, and many people will be familiar with the fact that they have two opposable digits on each hand – effectively giving them extra thumbs – which help them cling tightly to the trees (see A in the photo above). Fewer people are aware that they also have unusual adaptations on their feet. The big toe has no claw, enabling Koalas to grip the tree with their feet as well as their hands, and the second and third toes on each foot are fused together like a two-toothed comb; very handy (or should that be footy?) for grooming with (see B in the photo). Interestingly, the Koalas now found throughout the Adelaide and Mount Lofty Ranges region are not native to the area. In fact, Koalas may not even have been present in the region when humans first arrived in Australia; it is believed they actually went locally extinct about 100,000 years ago. However, in the nineteenth century, Koala numbers in the South East of South Australia and in the eastern states were significantly depleted by deforestation, disease and the fur trade, so 18 Koalas were released on Kangaroo Island in the early 1920s to establish an insurance population safe from these pressures. The Koala population on the island flourished, so some individuals were moved to the Mount Lofty Ranges and other parts of South Australia between 1959 and 1969. It is now believed that as many as 200,000 may be found in the region. As far as the Koalas are concerned, that's two thumbs up for the conservation project. But wait, that's not where the story ends. The large number of Koalas on Kangaroo Island and in the Mount Lofty Ranges has had an impact on the ecosystems they've been introduced into. They have been responsible for overbrowsing eucalyptus trees, leading to the decline of a number of trees. As a result a non-lethal Koala Management Program has been undertaken to manage Koala numbers through surgical sterilisation and translocation, as well as major restoration works in overbrowsed areas.

The cuddly Koala with the weird hands and feet needs to be managed to ensure it doesn't get too much of a foothold in our bush.

References:

- Koalas – past and present fact sheet
- A brief history of the Koalas of South Australia
- Australian Koala Foundation
- Living with wildlife – Koalas fact sheet
- Office of Environment Heritage (NSW) – native animal facts

Eddie the Echidna, a regular visitor to backyards in Bellevue Heights (Photo: Brenton Hay, Friends of Sturt Gorge)

Toothless predator brings out the claws

Residents of Bellevue Heights sometimes find a spiky visitor in their gardens, "Eddie" the Echidna, whose territory includes the adjacent Sturt Gorge Recreation Park.

Strong claws enable Short-beaked Echidnas to dig termites, ants and other invertebrates out of rotting wood or the ground, and because they have no teeth, their long tongue helps them to catch their prey. Short-beaked Echidnas have the widest distribution of any native Australian mammal, so you can find them in deserts as well as in forest and alpine areas, and backyards!

Could your school grounds provide enough habitat to support an Echidna? Use our primary years' investigation into Adelaide's biodiversity: past, present and future to explore what lives in your school, and take action to attract more wildlife.

Keywords and phrases: adaptation; food webs; predator and prey relationships; features of animals.

Reference:

- Australia Zoo – Short- beaked Echidna

The tiny Western Pygmy-possum. (Photo: Amanda McLean, University of Adelaide)

Small but mighty!

The Western Pygmy-possum (*Cercartetus concinnus*) is a small, mainly arboreal, nocturnal marsupial with an average weight of just 13 g and a head-to-body length of 81 mm – that's about the size of a pea pod! Believe it or not, it is the largest of the pygmy-possum family, Burramyidae. They are fawn or reddish-brown in colour above, white below, and have a finely-scaled, naked prehensile tail, which they use to help them move through foliage. They feed on nectar, pollen, insects and possibly small lizards, and have small claws on the upper surface of the toes on the forefoot, which they use to grasp food while eating. During the day, they retreat to leaf-lined nests in tree hollows or in the leaves of grass-trees (Xanthorrhoea spp.). Like all pygmy-possums, they enter mini hibernating periods called torpor. When temperatures dip below 12°C and food is scarce, they'll fall into a deep sleep to conserve energy for a day, or even up to two weeks. Torpid individuals avoid starvation by drastically dropping their body temperature, oxygen consumption and heart rate. This is often the only way that researchers can catch them in the wild, picking them up while they're still curled up in a tight ball.

They occur across much of southern Australia including south-west Western Australia, South Australia, western Victoria, and south-west New South Wales. Their preferred habitat is mallee heath and dry sclerophyll forest. Unfortunately, very little is known about the Western Pygmy-possums that live in the Adelaide and Mount Lofty Ranges, but they have been classified as critically endangered in the region.

Like almost all small native mammals in Australia, they face numerous threats including fragmentation, loss or degradation of habitat; introduced predators; and fire. To help protect them it's important to better understand their abundance and distribution. In June 2017, a team of ecologists from Natural Resources Adelaide and Mount Lofty Ranges, with volunteers from various Friends of Parks groups, set up 90 specially designed pygmy-possum nest boxes in four conservation parks on the Fleurieu Peninsula.

Wildlife cameras have been placed on trees opposite the boxes to capture any signs of activity. They will be closely monitored to collect further information about the possums in the area.

References:

- AMLR Threatened species profile fact sheet
- www.environment.sa.gov.au
- www.australianwildlife.org
- www.australiangeographic.com.au
- www.abc.net.au

In 1995 the Australian Nature Conservation Agency recommended that Rakali be adopted as the common name instead of Water-rat (Photo: MLP Photography)

A not so dirty rat

This furry little water rat is known as the Rakali and can be found along the banks of the River Torrens. Only one of Australia's two amphibious mammals (the Platypus is the other), the Rakali require permanent fresh or brackish water in which to live and eat a diet of fish, aquatic insects, spiders, frogs and reptiles. They live in burrows alongside river and lake banks and are generally nocturnal. They are most active in the early evening and early morning and when foraging for food, they often follow regular routes and tracks. Unlike other rodents, the Rakali has webbed hind feet and a waterproof coat. They have large bodies that can be up to 40-50cm long and they have a distinctive long tail with a white tip. The main characteristics which help people identify a Rakali from other rodents include:

- front teeth - one pair of distinctive chisel shaped incisors with hard yellow enamel on the front surfaces
- head - flattened head, long blunt nose with an abundance of whiskers, small eyes and small ears
- colouring - near black or grey to brown with a white/golden coloured belly
- tail - thick with a white tip
- hind feet - webbed.

Interaction with people: The Rakali is a protected species in Australia. This means it is illegal to catch, kill, trap or keep one. While they have been known to adapt well to urban growth near their homes, urbanisation and change of land use has threatened the survival of this creature. Foxes and cats have also been known to be a threat to the Rakali.

Unlike some other rodents, Rakali are not likely to come into your house. The habitat they prefer, and the food resources that they need, are not found in urban homes. They do not pose a threat to vegetable gardens.

Protecting this species: You can help protect this native species by leaving vegetation to grow around watercourses. This helps prevent bank erosion and maintain healthy aquatic ecosystems.

This article is from http://www.westtorrens.sa.gov.au/Environment_waste/Plants_animals/The_Rakali and permission to reproduce it in full was kindly granted by the City of West Torrens.

The Grey-headed Flying Fox has established itself in South Australia (Photo: Steve Walker)

Just hanging around

Halloween may be just behind us, but there are still plenty of bats hanging around if you look closely enough. One particular species, which has made itself at home in South Australia in recent years after a number of individuals migrated from the other eastern states, is the Grey-headed Flying Fox or Fruit Bat (*Pteropus poliocephalus*).

Out of more than 90 native bat species in Australia, this is one of the largest with a wingspan of almost 1 metre. The bats typically hang upside down in trees in large groups (sometimes up to 3000) called 'camps'. Their young are born in early spring, and learn to fly and feed themselves by six months of age.

You may have noticed them roosting in large trees around the Adelaide Botanic Garden near the entrance to the Zoo. They live there because it's a handy central location with lots of vegetation including the surrounding Moreton Bay fig trees which provide an ideal food source when in flower. These bats feed on the flowers of most native tree species and play an important role in preserving biodiversity by pollinating and dispersing seeds, in much the same way as native birds.

Regardless of not being fussy eaters, the species is still listed as vulnerable due to the decline in some of our native vegetation, particularly larger gum trees which are one of their favourite food sources.

You can find out more about our terrestrial ecosystems that provide habitat and how to help protect them by referring to our teacher information pack at http://www.naturalresources.sa.gov.au/adelaidemtloftyranges/education/for-educators/plants-and-animals/land-based-environments

References:

- https://australianmuseum.net.au/grey-headed-flying-fox
- http://www.adelaidebatcare.com.au/big-bats-and-little-bats-in-summer/

Lesser Long-eared Bat in flight (Photo: Michael Pennay)

Going a little batty

Grey Headed Flying Foxes are what most people picture when you mention bats. But the Adelaide region is home to nine species of naturally occurring bats. Known as microbats, they are much smaller than their fruit-loving cousins, with bodies about the size of a mouse and a wingspan of about 25 centimetres. One of the common bats you might find in our region is the Lesser Long-eared Bat. They prefer to roost alone, in pairs or groups of up to 200. They live in small crevices such as peeling or hanging bark, in tree hollows and, to a lesser extent, caves. However, due to habitat loss, they are often forced to roost in ceilings, hollow walls, canvas awnings and in garden or farm sheds.

The Lesser Long-eared Bat, like all microbats, is an insectivore. It likes to hunt near the ground and catches flying insects in-flight or snatches them off the ground. It will dine on grasshoppers, crickets and moths and also enjoys lacewings, beetles, flies, cockroaches and spiders. Long-eared Bats hunt moths by stealth, whispering when echo locating and listening for the wing flutters of insects, to catch them by surprise. Microbats help to keep insect numbers in check, including species that are agricultural pests. They are one of nature's pest controllers.

Microbats emit ultrasonic pulses of sound and use the echoes they receive back to create a 'sound picture' of the environment around them. Each species of microbat has its own unique echolocation call, most of which are outside human hearing range. By recording bat calls and converting them to audio files, scientists are able to identify different species and their behaviour patterns without ever having to see them. This is useful because microbats are nocturnal and, being small, they can be difficult to see.

Do you want to know if you have bats living in your local community? NRM Education has Batbox Baton detectors available for loan. Please contact us to find out more. Natural Resources SA Murray-Darling Basin **has more information on microbats, including teaching resources, You may also wish to visit the** Australasian Bat Society website.

Australian bats may carry Lyssavirus, a rabies-like disease that can be passed on to humans through bites and scratches, but less than one per cent of bats carry it. There have only been three human cases in Australia, all in Queensland, but it is best not to touch bats. Bats are not a problem in your backyard as they will avoid human contact, but if you are concerned please call Fauna Rescue SA's Bat Rescue Hotline on 0475 132 093.

The cute, but short-lived, Fat-tailed Dunnart (Photo: Alan Couch)

Life in the small, fast lane

This little critter is a Fat-tailed Dunnart (*Sminthopsis crassicaudata*), one of 19 species of dunnart in Australia. Of the 19, this species has the widest distribution and is found in every state except Tasmania. Its ability to survive in a range of different habitats is largely due to some clever adaptations developed over time.

Interestingly, Fat-tailed Dunnarts don't need to drink water at all because they get all the moisture they need from their prey (mainly insects). This means they can live in very arid conditions which other mammals may not be able to inhabit. They are also able to go into torpor, which is a form of hibernation when temperatures are low and food is scarce. They can basically slow their metabolic rate and drop body temperature from 34 to 14 degrees.

As its name suggests, this species has a tail nearly as long as its body and often almost as wide. This is because Fat-tailed Dunnarts store fat in their tails and draw from this as an energy source when their usual prey isn't available. Given they can eat their entire body weight in a single night, this is a useful feature.

As well as being the most widespread of the dunnart species, these creatures also have one of the shortest life spans. They live for just 15 to 18 months in the wild, although they have been known to survive for up to five years in captivity.

Major threats to them include habitat loss through land clearing, intense fire events and the use of pesticides in agriculture which can kill the insects they feed on.

Keywords: adaptation, life cycles, hibernation, habitat loss, living things live in different places

References:

- Bush Heritage Australia, 2020
- Atlas of Living Australia, 2020

Red Foxes have been introduced into Australia from Europe (Photo: Steve Walker)

Red fox in tooth and claw

The Red Fox (*Vulpes vulpes*) was brought to Australia by Europeans in the 1860s in southern Victoria by individuals that wanted to continue the practice of fox hunting. Subsequent releases in most states means that the Red Fox is now established across much of the country – with notable exceptions in the far north, and until the 1990s, in Tasmania.

Foxes are in the same family as dogs, Canidae, and there are 21 fox species worldwide, though the Red Fox is the only one that has a wild population in Australia. Given the Red Fox is generally nocturnal, most sightings occur at night, dawn, or dusk. As anyone with backyard chickens knows, foxes are abundant in suburban areas, with estimates of population density ranging from 3 to 16 individuals per square kilometre in urban areas. In farmland and bushland these numbers are much lower, suggesting that foxes are making use of scavenging opportunities as well as fruit, invertebrates and rodents that are found near dwellings.

Unfortunately, foxes have also caused or exacerbated conditions that have led to extinctions, particularly of ground-dwelling marsupials, birds, reptiles and amphibians. One factor that has increased their impact is a tendency to surplus-kill and cache the food for later consumption, which means they will kill more prey than they can immediately eat. Foxes have also been linked to increasing the distribution of some weed species; because they eat fruit such as blackberries, boneseed and olives and can then travel up to 15 kilometres before depositing viable seeds. Rabbits and foxes are often found in the same environment, because rabbits can make up a significant portion of a fox's diet, so the removal of rabbits can reduce fox numbers, although they often switch prey to native animals.

Controlling pest plants and animals is one of seven key priorities of Green Adelaide.

References:

- http://agriculture.vic.gov.au/agriculture/pests-diseases-and-weeds/pest-animals/a-z-of-pest-animals/red-fox
- http://theconversation.com/is-it-too-late-to-bring-the-red-fox-under-control-11299

An Indo-Pacific Bottlenose Dolphin jumps out of the water (Photo: Juanma Carrillo)

There's some-fin about dolphins

Social, highly intelligent, agile and playful, the Indo-Pacific Bottlenose Dolphin, *Tursiops aduncus*, is one of many marine mammal species to call Adelaide's coastal waters home. The Adelaide Dolphin Sanctuary, stretching from Port Adelaide to Port Gawler, is home to approximately 40 resident Indo-Pacific Bottlenose Dolphins. The Port River dolphins (as they're affectionately known) are the first known permanent metropolitan dolphin population in the world.

Despite having no vocal cords, dolphins can produce a diverse range of sounds to interpret the world around them. Whistles are thought to be used to maintain contact, identify individuals and locate other dolphins. Clicks are used for echolocation, which assist dolphins to navigate and hunt for food. Burst pulse sounds (squeaks and squawks) are more of a mystery. The communication functions and use of these sounds is still largely unknown. However, it is believed they assist in foraging and deciphering details about fish and other prey.

Perhaps because of their playful and seemingly friendly nature towards us, human-dolphin interactions have been sought and recorded throughout history. However, sadly it is human activities that threaten their survival. Some risks and threats to dolphins include marine litter and entanglement (discarded fishing gear is the biggest problem in the sanctuary), harassment and disturbance, disease (did you know that dolphins can catch pneumonia?), vessel strikes/speeding boats (can injure or kill dolphins), and habitat degradation and pollution. Protected areas such as the Adelaide Dolphin Sanctuary are vital to ensure the continued survival of these wonderful creatures.

If you're interested in learning more about coastal and marine environments, you might like to look at the teaching and learning resources available to download on our website.

References:

- National Parks and Wildlife Service South Australia – Adelaide Dolphin Sanctuary
- Whale and Dolphin Conservation

Fungi and symbiotes

Fungi comes in all shapes, sizes and colours

Fungi – the good the bad and the interesting

Fungi are one of the lesser understood life forms in our environment. They are not considered plants, as they have many different features – the main one being not having chlorophyll and therefore unable to get their energy from photosynthesis.

Fungi rely on the absorption of nutrients from natural debris such as dead plant and/or animal material. They play an important role in ecosystems as they are nature's composters (with the help of other living organisms).

The appearance of fungi usually occurs after rain – where the forest floor becomes full of colour and strange shapes – they can also be seen growing on logs or garden mulch in schools. It is their amazing colour and shape that has won them their reputation in fairytales and as a source of mystery and fascination. Although some, such as parasitic fungi, may struggle to earn a place in a fairytale.

Parasitic fungi put out airborne spores (like seeds) making their way onto a living invertebrate (insect or arthropod). They slowly paralyse their host and once it is dead, they will grow from inside of the body, sometimes out of their heads - just like in the movie Alien.

Other types of fungi include the underground mycorrhiza which form symbiotic relationships with plants – whereby both organisms benefit through increased absorption of nutrients. In Australia nearly 90% of plants depend on a mycorrhiza association. Native orchids in particular are known for their special association with mycorrhiza. There are even some fungi that are specialised to grow on animal faeces!

Although fungi are a key food source for humans and animals, there are poisonous species that occur in the Adelaide and Mount Lofty Ranges – fungi in the wild should never be eaten and expert advice should always be sought for identification.

Investigate which fungi are found in your area using our new Fungi of the Adelaide Hills identification chart.

Collared Earthstar (photo: Josef F. Stuefer | wikipedia)

Twinkle twinkle earthy star

There are many types of weird and wonderful fungi that can be found in the Adelaide Hills, one of them is *Geastrum triplex* also known as the Collared Earthstar. All earthstars consist of two 'skins' the outer 'skin' (*exoperidium*) and the inner one (*endoperidium*) which encloses the powdery spore mass.

The earthstar starts underground as an onion-shaped ball. When it emerges above ground, the outer skin breaks open, splitting into 5-8 star-like rays. This outer skin consists of three layers; its inner layer may be up to 5 mm thick and often cracks, forming a collar around the inner ball. The inner spore case is a ball with a thin skin.

At the top of this ball is a small 'beak' with a tiny hole through which the spores are released. The fungus can be 3-5 cm 'unopened; or 5-120 cm when 'open'. The spores can travel in the wind or a raindrop can hit the 'puff ball' pushing the spores out into the air.

Earthstars are found in woodlands amongst leaf litter usually in groups and occasionally on its own. Fungi play a very important role in our ecosystem and the earthstar is saprotrophic, which means it breaks down plant and animal material. The earthstar can be of no interest as far as edibility is concerned – they are far too tough and fibrous. The Collared Earthstar is found in many countries.

Investigate which fungi are found in your area using our new Fungi of the Adelaide Hills identification chart.

Turkey Tail is a common fungus found throughout the world (Photo: Steve Walker)

Turkey for Christmas?

NRM Education hopes you have a fun and relaxing Christmas with family and friends this year and if you find you've eaten too much turkey a walk in the woods may be a nice way to burn off a few extra calories. While you're out there keep an eye open for one of our common saprotrophic fungi, the Turkey Tail (*Trametes versicolor)*.

The word '*versicolor*' means various or variable colours and this refers to the different stripes that the fungi typically have on their upper surface, which resemble the tail feathers of the North American Wild Turkey. The lower surface is usually a pale grey or white.

Saprotrophic fungi break down plant and animal material and the Turkey Tail is normally found growing on dead logs and stumps. The visible 'tail' is actually the fruiting body – like a mushroom – with the bulk of the fungus growing inside the decomposing wood.

When dried the fruiting bodies become tough and leathery and have often been used for making jewellery and other decorations. They can also be used to produce dyes for colouring fabrics.

While Turkey Tails are not considered poisonous, they are not usually eaten either. However, there has been research suggesting that some of the chemicals produced by this fungus may be useful in medicine, particularly in the treatment of various cancers.

As always, don't eat any wild fungus unless you've had it identified by an expert as safe.

If you're interested in finding out more about the fungi in the Adelaide and Mt Lofty Ranges, you can download a copy of our identification chart.

Don't get too close to this foul-smelling fungus! (Photo: https://www.flickr.com/photos/lonqueta/)

Scent fools flies

As we approach April Fool's Day, what better way to celebrate than learn from one of nature's cleverest foolers - the Starfish Fungus?

Aseroe rubra, also known as Stinkhorn, derives its genus name from the Greek words '*Ase*' and '*roe*', translating to 'disgusting juice'. It generally only lives for a short time but in order to increase its spread, it produces sticky spores with a foul smell like rotting meat to attract flies. When the flies land on the fungus, they pick up these spores on their feet and then transport them to other areas- and before we know it, the Stinkhorn population is thriving.

This clever adaptation is a great example of how nature plays tricks to ensure the survival of certain species. Being a fungus, Stinkhorn generally grows in low-lying woodland areas with lots of moisture and leaf litter- but another feature it uses to help it stand out is its remarkable appearance. Pink to bright red in colour, it has between six and nine pairs of 'arms' emerging from its centre, giving rise to the name 'Starfish Fungus'.

It begins life as an egg-like sac on the ground, which eventually opens up to reveal this distinctive anemone-like structure. This means it is classified as a 'stomach fungus' because it produces spores whilst enclosed in an outer skin - not a common occurrence in the fungi world.

There is debate over whether or not this fungus is toxic, but we would definitely not recommend touching it if you spot one in your garden or whilst out and about - not that you would probably want to anyway!

Nevertheless it is one of nature's many fascinating examples of a unique species, and a great one to learn about in the classroom - perhaps as part of a larger unit around fungi in general. Students will be drawn to the idea of its foul smell, and this could be a great starting point to get them talking about the physical adaptations of living things.

For other great examples of resources relating to living things and their adaptations, check out the plants and animals page on our website.

Scarlet Bracket (Photo: Kathleen Matthews)

Indigenous fungi – the next bracket

NAIDOC Week runs from the first to the second Sunday of July every year, celebrating the history, achievements and culture of Aboriginal and Torres-Strait Islander people. As part of NAIDOC Week we thought we'd take a look at the fascinating traditional uses of one of the more commonly seen Fungi of the Adelaide Hills – Scarlet Bracket.

There are two species of Scarlet Bracket found within Australia - *Pycnoporus coccineus* and P*ynoporus sanguineus*. Only *Pycnoporus coccineus* is found locally within the greater Adelaide metropolitan area and it has been found to contain two antibiotic compounds within the fruiting body.

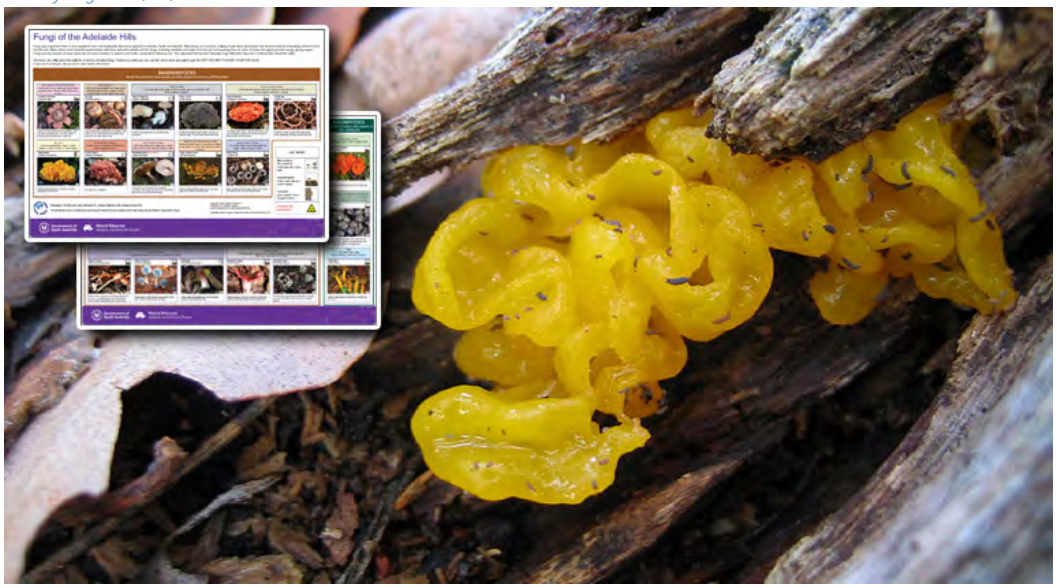
Early recordings from European settlers commented on the use of the fungus for medicinal purposes by aboriginal people. It is thought that the fungi can be used to aid in the healing of mouth ulcers and oral thrush in babies.

Scarlet Bracket is sometimes referred to as a shelf fungus due to the way the fan-shaped fruiting body sticks out like a shelf from dead or decaying wood. Scarlet Bracket can be identified by the bright red to orange colour of the fruiting body that tends to fade over time. Scarlet Bracket is a saprotroph, and as such decomposes organic matter, helping to recycle nutrients back into the soil.

WARNING: We know very little about the edibility or toxicity of native fungi. There is no safe way you can tell which ones are safe to eat or touch. DO NOT EAT OR SUCK ANY FUNGUS FROM THE WILD. If you touch a fungus, always wash your hands afterwards.

Reference:

- Australian National Botanic Gardens website



The gelatinous Yellow Brain (Photo: Brett Coulstock. Inset: our fungi identification chart.)

Be a mycologist

On a rainy day in winter we encourage you to go for a walk in the Adelaide Hills and look for fungi using NRM Education's Fungi ID chart. If you are lucky you might see at your feet *Tremella mesenterica*, commonly known as the Yellow Brain or Jelly fungus. The common name refers to its gelatinous and folded form and it varies from translucent to white or yellow in colour. The generic name *Tremella* means trembling, in reference to its wobbly, jelly-like structure. Interestingly, this spectacular fungus may only appear in this form for a few days before it shrinks, dries and disintegrates.

Unlike plants, fungi do not have chlorophyll so they don't photosynthesise. Instead, Tremella parasitises another fungus that grows on dead wood. *Tremella* is in the phylum Basidomycota, which means it produces spores on microscopic club-shaped cells called basida arranged on the outer surface of its gelatinous body.

While we encourage you to look at and photograph this beauty, we don't recommend touching it and definitely discourage eating it. While some people report that this fungus is edible, *Tremella* have been known to contain the mind-altering drug psilocybin.

As fungi are frequently poisonous and scientists are still unsure of the toxicity of many Australian fungi, it is always best to avoid consuming wild fungi unless accompanied by an expert.

References:

- A field guide to Australian Fungi by Bruce Fuhrer
- First Nature

Key words: food web; features of animals and plants; competitive relationship

The saprotrophic Smooth Cage breaks down plant and animal material (Photo: Phil Bridle)

You've been struck by a Smooth Criminal

The Smooth Cage fungus, *Ileodictyon gracile*, is distinguished by its off-white skeletal cage – looking somewhat like a soccer ball with the panels removed.

This fungus is in the stinkhorn (Phallaceae) family, which as the name suggests, means it's pretty smelly; this one emits a sour milk or cheesy odour. As well as usually being smelly, another interesting trait is how the Smooth Cage can detach itself from its base and roll along the ground to help spread fungal spores. Spores are the fungal kingdom version of seeds, containing all the genetic information to create a new colony.

Did you know this fungus recycles dead logs and branches? Most fungi are recyclers – breaking down dead matter and returning the nutrients to the soil. Other fungi partner with plants in a mutualistic relationship; the fungi pass nutrients and water from the soil to plants' roots, and the plants provide sugars to the fungi.

NRM Education has the Fungi of the Adelaide Hills ID chart for adults and children to search for these wonderful specimens. Search alone or with other fun-guys (and fun-girls). Fungi can be found throughout the year but are most common in autumn and winter, particularly following rain.

Please be careful when discovering fungi - they're quite fragile, play an important role in the ecosystem, and some are poisonous.

References:

- http://fungimap.org.au/index.php/fduonline-home/103/294/stinkhorns/P-ileodictyon-gracile-cibarium
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Key words: weather; decomposers; living things depend on each other; seasons; mutually beneficial relationship; classification; features of animals and plants.

Green is not a common colour in fungi (Photos: Steve Walker)

Is there a skinhead in your garden?

The Green Skinhead fungus is a medium-sized mushroom growing up to 8 cm in diameter and 10 cm tall. It starts out dome-shaped (see inset) but flattens as it grows. Unusually for fungi, it has a green cap, with a pale-yellow to mustard or golden stem, and it grows on the ground within leaf litter in eucalypt forests and woodlands. It forms strong symbiotic relationships with the eucalypt trees. Each provides essential nutrients that the other cannot produce itself.

This fungus was originally described by Professor Sir John Burton Cleland, after whom Cleland Conservation Park is named. He collected specimens throughout South Australia. It also occurs in Tasmania, Victoria, New South Wales and Western Australia making it a true-blue Aussie mushroom. In fact, the green in Australia's national colours of green and gold was chosen in part to represent the forests and eucalyptus trees of Australia's landscapes, so it is extremely fitting that this green and golden fungus has such an important connection with these habitats.

The edibility of the Green Skinhead is unknown, so it should not be consumed, as some of its close relatives contain lethal toxins. However, if one is lurking in your garden be assured it is providing an important contribution to your eucalypts. Why not download our Fungi of the Adelaide Hills ID chart and explore your school yard or local parks and reserves to see which fungi our growing in your area?

References:

- http://know.ourplants.org/the-plant-press/plant-of-the-month-though-not-a-plant-cortinarius-austrovenetus/
- https://ehhbreserve.wordpress.com/2013/06/11/another-fungi-encounter/
- www.dpmc.gov.au/government/australian-national-symbols/australian-national-colours
- https://en.wikipedia.org/wiki/Cortinarius_austrovenetus

Keywords and phrases: producers; consumers; classification; living things live in different places; living things depend on each other; features of animals and plants; mutually beneficial relationship.

The hard, button-like, white-grey fungus dotted with tiny star-shaped holes grows on Kangaroo poo! (Photo: David Catcheside)

A fungus that grows on poo

A mushroom that kids are sure to love - Dung Buttons (*Poronia erici*) - is a species of fungus that grows on poo. It mainly forms on marsupial faeces, but occasionally grows on the dung of non-native herbivores. Dung Buttons are hard, white-grey, and button-like. They expel spores onto surrounding vegetation through tiny but distinctive dark star-shaped holes (ostioles) on their surface. Animals unknowingly eat the spores when feeding on vegetation, and then pass the spores when they defecate. The spores germinate and form new buttons on the dung. Fungi like these that form on dung are called coprophilous fungi.

A similar fungus is the Large Dung Button (*Poronia punctata*) but, as its name suggests, this is bigger and grows on cow, horse, sheep or rabbit dung rather than marsupial dung. If you want to identify these types of fungi, try looking at the dung they inhabit, as well as their button and spore size.

You can find information of this fungus and many others on the Fungi of the Adelaide Hills ID chart – it's a great resource to help you learn more about our fascinating fungi.

Key words: Lifecycles; Decomposers; Adaptation; Features of animals and plants; Living things depend on each other; Effects of introducing new species; Classification

References:

- https://fungimap.org.au/index.php/fduonline-home/141/294/discs/P-poronia-erici
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- http://www.first-nature.com/fungi/poronia-punctata.php
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Accurate identification of lichen may require examination of microscopic structures (Photo: Steve Walker)

Better together? I'm lichen what I'm seeing.

Did you know that there are over 3000 species of lichen in Australia, and over 20,000 throughout the world? They are typically terrestrial, growing on rocks, bark, leaves, and soil in areas as diverse as the arctic tundra, deserts, tropical rainforests, and rocky coasts. There are even aquatic lichens and some that can survive in toxic slag heaps around mines and foundries.

Perhaps the strangest thing about lichens is that they are classified with fungi but they are actually a composite organism made up from an alga and/or a cyanobacterium in a symbiotic relationship with a fungus. The alga and cyanobacterium are able to photosynthesis using chlorophyll so, like regular plants, in sunlight they can generate the carbohydrates that the composite lichen uses for food. The fungus provides the structure and area to capture the water and minerals. The cyanobacterium is also able to fix atmospheric nitrogen, providing additional nutrients. It's a win-win situation with each of the component organisms bringing something to the party and receiving a gift in return.

The composite lichen contains structures which are not present in the individual organisms and they are able to produce chemicals that alga, fungus or cyanobacterium cannot produce independently. It has been reported that more than 800 of these chemicals are produced by lichens, with many not being manufactured by any other organisms.

Interestingly the algae and cyanobacteria that form the symbiotic relationships can often be found free-living, but none of the fungi exist independently in nature.

Lichens are incredibly important organisms because they are amongst the first colonisers on newly barren surfaces and by trapping moisture, soil and other debris they help to modify the area, making it useable by complex plants.

Reference:

- Australian National Herbarium – Australian Lichens

Dessicating Nostoc in the Adelaide Parklands (Photo: Amy Blaylock)

Worts and all, this slime nourishes

Have you ever found a green or brown slimy mass on your lawn? This is not evidence of an alien visitor; it is likely to be *Nostoc*, a type of cyanobacteria. Nostoc can be free-living or in symbiotic relationships in terrestrial or freshwater environments. If you have poor draining soil and lots of phosphorus fertiliser, you are creating great ideal conditions for *Nostoc* to thrive. It may not look tasty but there are several edible species such as *Nostoc flagelliforme*, which has been eaten in Chinese culture for hundreds of years. Researchers are currently investigating how to scale up to commercial production levels for several species, but humans aren't the only ones being fed by *Nostoc*.

On a smaller scale, there are hornworts and liverworts that have a symbiotic relationship with *Nostoc*. Cyanobacteria can photosynthesise, as well as convert or fix nitrogen from the air into a form that plants can use. Research on one hornwort found it released chemicals which attracted cells from *Nostoc* colonies to glide over wet surfaces into special cavities. Once there, the hornwort released different chemicals so that the *Nostoc* would grow a colony of non-mobile cells that would stay and fix nitrogen for it. In turn it provided the non-photosynthesising colony with carbohydrates.

Warning: **Some species of *Nostoc* are poisonous. Please do not collect and eat *Nostoc* from the wild. For other strange forms that are symbiotic and nourish or kill people, have a look at the** Fungi of the Adelaide Hills.

Keywords and phrases: classification; features of animals and plants; mutually beneficial relationship; science informs changes in human practices; effects of human activities.

References:

- Australian National Botanic Gardens
- Chinese studies on the edible blue-green alga, Nostoc flagelliforme: a review
- Food and Agriculture Organization of the United Nations
- Michigan State University Extension

The mycelium structure of a fungi under an overturned log (Photo: TheAlphaWolf, wikimedia commons)

Growing eco materials

Fungi are an amazing kingdom of creatures. All fungi have a mycelium; the mass of branching, threadlike hyphae, often underground, that transports nutrients and sends signals. The most visible part of the fungus that we call a mushroom or toadstool is the fruiting body. Mycelia also create the strength and structure of fungi, branching out like a network, linking the roots of different plants forming a mutually beneficial or symbiotic relationship. Plants provide fungi with food in the form of carbohydrates, and the fungi help the plants to take up water and nutrients like phosphorus and nitrogen. Plants can also transfer nutrients to another plant through the mycelia and many of our local native plants have important symbiotic relationships with the mycelia of fungi.

Gavin McIntyre and Eben Bayer from New York are harnessing the power of fungi to invent eco materials. Their first fungi invention was a substitute for polystyrene packaging. They use hemp waste materials and mycelia to create custom made moulds for packaging products such as electronic goods and glass products. In their process mycelia are added to the agricultural waste and they act as nature's glue.

Mycelia multiply exponentially, so the packaging can be created in just nine days. At the end of its use it is 100% compostable when broken apart and buried, unlike polystyrene. The application of this mycelium foam has now been extended to other products, including makeup sponges, foam in foot wear, insulation in puffer jackets and cushioning in chairs.

Key words: Features of animals and plants and science informs changes in human practices.

References:

- https://mushroompackaging.com/
- http://www.bbc.com/earth/story/20141111-plants-have-a-hidden-internet

The strange-looking Bird's nest fungus (Photo: Kirill Ignatyev)

Not all bird's nests are found in trees

The Bird's nest fungus *Cyathus olla* is typically found on woody debris, because it obtains nutrients from the breakdown of organic matter. As its name suggests, this greyish-yellow fungus resemble tiny nests filled with miniature eggs.

The egg-like structures are called peridioles and are full of microscopic spores which, when splashed with rain, are hurled out of the nests. This clever strategy allows the spores to disperse and germinate, eventually producing new fungi. While the maximum ejection distance of *Cyathus olla* 'eggs' is less than that of other species of bird's nest fungi, they can still travel as much as 80 cm from the nest.

Bird's nest fungi are unusual and beautifully intricate but being tiny they are often hard to spot, so be sure to keep an eye out for them. You won't be disappointed if you see them.

To find out more about our local fungi, check out the Fungi of the Adelaide Hills ID chart**.**

References:

- yellowelanor.com/birds-nest-fungi/
- wikipedia.org/wiki/Cyathus_olla#cite_note-16

The Yellow Navel fungus is more than it first appears (Photo: Steve Walker)

Navel gazing

The Yellow Navel (*Lichenomphalia chromacea*) is typically grouped with the gilled fungi because of the wide spaced stems on the underside of its moist-looking cap. However, the Yellow Navel is actually a lichen (also known as a lichenised fungus); a symbiotic relationship between a fungus and an alga or a cyanobacteria. The alga contains chlorophyll and is therefore able to make carbohydrates through the process of photosynthesis. Fungi do not have chlorophyll and therefore need to absorb carbohydrates other organic/carbon matter.

Yellow Navels are typically found in large numbers in an algal mat, and although each fruiting body is only one to three centimetres, the bright colour makes them quite visible.

There are about 3000 lichens known to grow in Australia and they can be found growing in almost all terrestrial areas, including natural areas like deserts, cool rain forests and in the tropics, as well as on artificial substrates such as concrete, glass, metal and bitumen.

As many lichens are extremely sensitive to pollution, they are often used as pollution bio-indicators.

If you're interested in identifying more types of fungi, you might like to download our Fungi of the Adelaide Hills ID chart.

Reference:

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- https://www.anbg.gov.au/lichen/what-is-lichen.html
- https://www.anbg.gov.au/lichen/basidiolichens.html
- https://www.majordifferences.com/2013/07/difference-between-fungi-and-lichen.html

Grasses, algae and other water plants

Posidonia seagrass, commonly referred to as ribbon-weed or tape-weed. Photo Bob Baldock.

The gills of the earth

Hands up if you've heard the expression 'rainforests are the lungs of the earth'. You wouldn't be alone in thinking that this statement is true. The reality however is that this is only half the story.

This week is World Oceans Week, a great opportunity to celebrate our oceans. Oceans should equally be considered the lungs, or gills, of the earth as roughly 50% of all atmospheric oxygen is produced there - specifically by the phytoplankton in the surface waters.

Somewhat closer to shore is a group of organisms that you may be familiar with - seagrasses. Seagrass meadows are an important habitat and food source for a range of marine species, including commercially important fishery stocks. These underwater meadows are important for seabed stability as their roots stabilise the sediments that they occur in.

Recent research has shown that seagrasses along with mangroves can capture atmospheric carbon up to 40 times faster than terrestrial forests and store it in the seabed for thousands of years. This role as a natural carbon sink is critical in the face of climate change.

Unfortunately, like most coastal areas of the world, our seagrass meadows are under threat by human induced impacts. Seagrass has been declining across the Adelaide metropolitan coastline for the past 60 years, with approximately 5200 hectares disappearing. Increases in sedimentation, turbidity, and nutrient concentrations have been identified as primary agents of seagrass loss.

We can though all do our bit to address the situation. Improving the quality of stormwater runoff in our catchments is vitally important.

If your school would like to find out ways that you can achieve this, please contact your local NRM Education Officer to find out how.

A seagrass meadow in Croatia (Source: http://www.flickr.com/photos/alessiodl/)

The ocean forest - seagrasses and kelp

March 1-9 2014 is National Seaweek.

Did you know that over 70% of the planet's surface is ocean and that half of the planet's oxygen is produced in the ocean? That makes the ocean's ongoing health rather important!

Locally, we are blessed with many seagrasses and kelp forests in our sheltered, shallow coastal waters of the St Vincent and Spencer gulfs. Seagrasses provide habitat and nursery grounds for many marine animals (e.g. whiting, prawns, abalone, reef fish, and crayfish). About forty times more animals occur in seagrass meadows than on bare sand.

Seagrass mostly have ribbon-like, grassy leaves and are the only flowering plants that can live underwater. Seagrasses also use sunlight to produce oxygen, which makes them even more important to have around.

But here's the thing: increasingly, our ocean forests are at risk. Kelp forests thrive in water temperatures of 15-20°C, but die in temperatures above 25°C. Current sea surface temperatures in the gulfs are 22-25°C, according to the Bureau of Meteorology.

Dr Bayden Russell, a marine biologist at the University of Adelaide, says "key habitat species of kelp and seagrasses are at risk of being pushed beyond their thermal tolerance by the combination of long-term sea temperature increases and extreme short-term heatwaves….if you lose your seagrass, you lose your whiting, you start to see losses of abalone. Shallow waters such as SA's gulfs are most vulnerable and the longer a heatwave runs, the more dangerous the effect of warmer seas (Advertiser 16/1/14.)"

Although some people consider them weeds, Bulrushes are important native plants in our waterways.

Bulrushes in

Sunday 22 March is World Water Day, which is a great opportunity to take stock of the importance of water in our lives. Access to clean water is not something we struggle with on a daily basis, though for people in other parts of the world it is a difficult and time-consuming ritual.

One aspect of water management we are improving is the attention paid to the water that flows into the ocean. The creation of wetlands to help reduce pollutants flowing out to sea is an important function of these places, as well as being areas of biodiversity and public amenity. This is where Bulrushes (*Typha* spp), also known as Cumbungi, come in. Rushes and reeds play an important part in improving water quality and they do this in a number of ways.

Firstly, their extensive roots and tightly-packed growth habit are excellent for slowing down the velocity of water, which allows polluted sediment to fall to the bottom of the pond. Secondly, the roots also provide habitat for microorganisms that break down and digest pollutants, as well as host a range of other macro invertebrates that increase the amount of life in the wetland, feeding birds and fish. Finally, the Bulrushes themselves are hungry feeders, absorbing nutrients from the water and turning them into rapid growth – this great for colonising a new wetland but they do have the potential to become weedy in creeks and rivers if left unchecked.

This attractive, strappy leafed plant grows from a rhizome that sits under the water and reaches around 2 m in height. Aboriginal uses for this plant included harvesting the rhizomes and extracting glutinous flour with which they made damper, though this is not recommended for plants that are growing in polluted water. The leaves were also used to make a very strong string, suitable for making baskets and dilly bags. The two locally native species of Typha, domingensis and orientalis are difficult to tell apart but the family is easily recognised by its brown, sausage-shaped flower spike.

Check out the World Water Day website for inquiry questions.

Lemon-scented Grass (Cymbopogon ambiguus)

A bush ballerina

The tall and elegant native Lemon-scented Grass is used traditionally as a spice - the leaves were placed in a kangaroo's gut prior to baking on hot coals - and comes from the lemon grass family.

Lemon-scented Grass is also finding new uses as a landscaping plant, because of its attractive tall seedhead stalks and symmetrical appearance. It looks like a bush ballerina, with its summery gold-plaited locks of seedheads and blue-green skirt of leaves.

An easy way to keep most native grasses on site permanently is to plant them (or simply broadcast the seed) into a layer of riverbed pebbles, where the seeds will naturally colonise the site because they love the microclimate provided by the pebbles which also enables them to germinate/grow with minimal competition.

Another modern use is to dry and dice their distinctly lemon flavoured leaves and infuse them into tea.

Lemon-scented Grass requires full sun and relishes a site with some additional moisture, such as an occasionally dry creekbed.

In the Flinders Ranges they line dry creekbeds in their tens of thousands.

A Kangaroo Grass spikelet (Photo: Mike Bayly, http://wpvherbarium.biosciences.unimelb.edu.au)

Here come the autumn colours.....it's summertime!

Kangaroo Grass, *Themeda triandra*, is one of Australia's most widespread species. A perennial grass growing to one metre high and wide, it is adapted to environments as diverse as the northern arid interior, temperate woodlands and alpine areas.

Its leaves are 10 - 50 cm long and 2 - 5 mm wide and vary from green to grey, drying to an orange-brown in summer, which is also its flowering season when it produces distinct large red-brown spikelets on branched stems. Why not encourage students to explore the colour change as a way of reading the change of seasons?

This attractive grass can be used as an ornamental plant in rockeries or as part of a native habitat garden or grown in a more formal garden for its interesting colour and texture. It grows in full sun to part shade on sandy to clay soils and needs little water once established.

Aboriginal people have many uses for Kangaroo Grass; it is very palatable when young, but has only a moderate nutritive value; the seeds were harvested, separated and ground into flour using grinding stones and the flour was mixed with water and baked to make damper. Stems are also suitable for making string and baskets.

Can you think of ways to include Kangaroo Grass in your teaching? Why do you think it is called Kangaroo Grass?

Reference:

- https://www.anbg.gov.au/gnp/interns-2004/themeda-triandra.html

Ecklonia radiata provides habitat for fish and (inset) a close-up of the holdfast (Photos: Jeremy Gramp)

Brown and slimy but kind of cool

This time of year is one of the best times to get out and explore the wonders of our southern temperate waters. For the time being the water temperature remains about as high as it gets, so you can quite easily go snorkelling without a wetsuit. One of the most iconic species of our southern temperate reefs is the Common Kelp, *Ecklonia radiata*. *Ecklonia* is a type of large brown macroalgae. Macroalgae, or seaweed as they are sometimes called, form a major structural component of subtidal reef systems.

As the photo above shows, *Ecklonia* is brownish-yellow in colour and consists of a stem-like part bearing a flattened blade with distinct lateral 'leaves'. Unlike seagrass, which grows in soft sediment and has roots to anchor it, *Ecklonia* is instead attached to a hard substrate via a holdfast. The holdfast not only keeps the plant anchored to the substrate but it provides a perfect habitat for myriad marine invertebrates. The 'leaves' of Ecklonia form a canopy that fulfils a similar role to terrestrial plants by providing habitat structure and shelter for numerous other marine species, and it forms the basis of many food chains.

Ecklonia is one of the easiest algal species to identify, because it is much larger than other canopy algae in our waters and, as a result, occupies more space than similar species. Like other macroalgae, *Ecklonia* requires light, so it is restricted to relatively shallow depths that contain a suitable substrate. In the waters of the Adelaide & Mt Lofty Ranges region it is naturally found south of Seacliff.

Ecklonia is a critical component of a healthy temperate reef marine ecosystem but it is threatened by increased sedimentation from coastal run-off and from water temperature rises as a result of climate change. If you walk along beaches in this region you will most likely have seen Ecklonia washed up on the sand, particularly after a storm. Either the 'leaves' have been ripped off or sometimes the holdfast has become detached and the whole 'plant' is washed up. Once on the beach and exposed to the sun *Ecklonia* dries out and turns black in colour.

The Department of Environment Water and Natural Resources Marine Parks team has recently released a publication called 'A Snorkeler's Guide to plants and animals in South Australia's Marine Parks'.

Flat-sedges are important for biodiversity (Photo: Jeremy Gramp)

Weave Flat-sedge into your garden and curriculum

The Flat-sedge (*Cyperus vaginatus*), named for its sheath-like leaves, is a densely tufted plant with long graceful stems. It is often found growing in damp places, such as near creeks, wetlands or in poorly drained soil. It grows up to one metre tall and forms a clump around one metre wide.

There is a mnemonic device (memory aid) that is quite useful in distinguishing between sedges, reeds and grasses, all of which look quite similar in form and habit, "***Sedges have edges, rushes are round, grasses are hollow right up from the ground.***" There are obviously exceptions but the Flat-sedge follows this rule and has triangular stems that can be felt when rolled between the fingers.

Sedges are important plants for biodiversity, especially for the Sedge-skipper group of butterflies, which is heavily reliant on them for hosting its caterpillars. While many adult butterflies can visit numerous species of flowers for nectar, their caterpillars tend to be fussier and have specific requirements, such as just one or two preferred species of plant.

Flat-sedges and their close relative the Spiny Flat-sedge are also used by aboriginal people for weaving and making string. Large nets, bags and baskets are all made from this humble plant, and it is possible to learn the techniques from people still practicing this ancient craft. To weave this plant into your lessons, look at subjects such as Design and Technology, Art and, of course, the cross-curriculum priorities of Sustainability and ATSI.

For all these reasons Flat-sedges make an excellent addition to natural learning spaces such as frog ponds, indigenous gardens and butterfly gardens.

Sea Rush, a highly salt tolerant wetland plant. (Photo: Jeremy Gramp)

From the hills to the ocean – take advantage of the SEA-nery

On 2 February we celebrate World Wetlands Day. The importance of storing, cleaning and using captured stormwater is an increasingly valued process and happening in many South Australian local government areas. Constructed wetlands are used to clean and store stormwater that runs off of our roofs and other surfaces into the street and down the drain. After the water has been cleaned through reed beds, the water can be recycled and used for non-drinking purposes, such as watering lawns and flushing toilets. Some wetlands are attached to an aquifer recharge scheme, where the cleaned water is injected underground into the aquafer to be stored and used at a later date. For more information on Wetlands, visit the Water page on the NRM Education website. One particular hardy species of wetland plant that is often planted within constructed wetlands is Sea Rush, also known as *Juncus krausii*. Like all plants, Sea Rush helps to clean water, so it is used in many stormwater cleaning and retention wetlands, such as the Urrbrae, Warriparinga and Greenfields Wetlands.

Wetland plants also increase habitat for native animals, as well as produce food for animals to eat. The large network of roots and perennial nature of the Sea Rush make it a popular wetland plant for its ability to hold the soil in place and to provide shelter for aquatic life. Native to Australia, Southern Africa and South America, it is found in all states and territories, except the A.C.T. It is a particularly hardy species growing in many different soil types, including particularly salty conditions, hence the name, Sea Rush. It tolerates areas with high salt concentrations, such as coastal and salt marshes, the intertidal zone and areas close to salt lakes, as well as low saline environments. It is commonly found in the riparian zone, the area of land bordering watercourses. Sea Rush is not to be confused with a weedy relative, the Spiny Rush (*Juncus acutus*). The look similar and tend to occupy similar areas and tolerate high levels of salt within the soil, but Spiny Rush is a particularly invasive plant species which can produce thousands of seeds that are transported via wind and water resulting in the colonisation of land downstream.

For more information on *Juncus acutus*, please visit the Pest Plant section of the website.

Water-ribbons at the Tatachilla Lutheran College wetland (Photo: Jeremy Gramp)

The blue ribbon plant for your pond?

Do you have a frog pond or maybe even a school wetland? If so a brilliant local native plant that you should consider adding is *Triglochin procera*, commonly called Water-ribbons. Water-ribbons naturally occurs in shallow, slow-flowing streams or semi-stagnant water, such as wetlands, and can be found throughout the temperate regions of Australia. It is a prolific grower, occurring in water up to 1.5 m deep, and has long leaves which grow up to 2 m long and up to 4 cm wide. In flowing watercourses the leaves float on the surface, whilst in shallow still waters the leaves stand erect.

From August to April the plant produces a flower spike containing tiny greenish-yellow flowers. The small green fruits which develop on the spike can be eaten and apparently have a pleasant taste of fresh peas. It is, however, more common for the tubers of the plants to be eaten. The tubers, which are often found quite deep in the mud, were probably an important staple food for many aboriginal groups throughout much of Australia. The bland, starchy tubers were roasted, pounded and fed to teething babies and the elderly. The raw or roasted tubers were also eaten by adults. The taste has been compared to water chestnuts.

Water-ribbons is also a critically important piece of the habitat jigsaw for many of our native fish species. Native fish require cover in the form of 'stable cover', such as tree roots and rocks, and 'biological cover', which includes floating leaved aquatic plants. The long floating leaves of Water-ribbons fulfils this requirement perfectly, not just for native fish but other native animals such as frogs. So it is definitely an important plant to put in your wetland.

Finding a native nursery where you can purchase Water-ribbons can be a little tricky, but some do stock it. There are also specialist aquatic plant nurseries. So don't be disheartened if the first place you try does not have it.

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Neptune's Necklace (photo: Jeremy Gramp)

Slimy pearls of wisdom

Neptune's Necklace (*Hormosira banksii*) has many names, including Neptune's Pearls, Sea Grapes, and Bubbleweed. They are all good descriptions of what this marine algae (a type of seaweed) looks like – a string of round, olive-green bubbles. Each bubble (said to taste like a salty rubber band) contains air, which allows the chain of beads to hang vertically in the water and get maximum light for photosynthesis. The bubble is covered in a slimy substance and also contains water, which helps stop it drying out if it becomes exposed to the air and sun as the tide recedes.

Its favoured habitat is in the intertidal zone (the area that is sometimes underwater and sometimes exposed on the shore), and it is also found on shallow reefs. Each holdfast, which acts as an anchor to hold the strings of pearls to the rocks, can have multiple strings that reach around 30 cm long. These colonies of individuals can form large mats, creating important habitat for crustaceans like crabs, and gastropods like abalone, periwinkles and many other kinds of sea snails. They love the protection Neptune's Necklace gives them from predators, and because the area stays nice and damp between tides.

Neptune's Necklace is one of the more common seaweed species you can see washed up on our beaches, and the best time to go looking is after winter storms, because the strings are easily dislodged by strong waves. Each bubble can form a new plant, so it's important not to remove them from the beach.

Here's a handy guide to some of the amazing beach treasures you can find. World Oceans Day is June 8, so why not start exploring now?

Keywords and phrases: Plants provide shelter; Living things depend on each other; Producers; Living things live in different places; Features of animals and plants

References:

- https://www.pathwayz.org/Tree/Plain/Neptunes+Necklace
- https://en.wikipedia.org/wiki/Hormosira

Blunt Pondweed (Background photo: Michael Bedingfield, Canberra Nature Map. Inset: 'eyeweed', flickr)

Let's be blunt, this is no weed

You might have heard of 'bio-indicators' - living things which indicate the health of an ecosystem. Examples include macroinvertebrates (water bugs), some of which are pollution intolerant and therefore only live in clean water; or particular native frog species which are more abundant in areas where biodiversity is higher. Blunt Pondweed (Potamogeton ochreatus) is known as a Wetland Indicator Species or WIS, which is a species that has evolved to rely on wetland environments for its survival.

This plant grows in rivers and lakes in water up to 5 m deep and is most commonly found where the water flows slowly or is stationary much of the time. It is listed as near threatened in South Australia, and in recent years Natural Resources Adelaide and Mount Lofty Ranges has identified the occurrence of the Phytophthora fungus within 2 km of almost every known Blunt Pondweed population in our region.

Like many other water plants, Blunt Pondweed is not an introduced species. It is called a 'weed' because it has properties that make it more likely to become invasive and out-compete other native plants for resources. In the case of Blunt Pondweed this is because it grows thick fibrous stems which spread over the surface of the water, making it difficult for other native water plants to grow. It also has few natural predators to control its growth - only select species of water birds and fish are able to eat this plant because of its hardy structure.

Can you or your students think of any other native 'weedy' plants like this? It's an interesting world of plants out there that can form the basis of a learning enquiry for students.

Images:

- http://canberra.naturemapr.org/Community/Sighting/27396
- https://www.flickr.com/photos/eyeweed/4458999189/

The seeds of Bottlebrush Grass look a bit like an octopus or a badminton shuttlecock (Photo: Chris Hall)

Bottlebrush Grass

Bottlebrush Grass (*Enneapogon nigricans*), also known as Nine-awn Grass, Shuttlecock Grass, Octopus Grass or Bottle Washers, is one of our native grasses named because it is said to resemble the shape of a long-handled bottle-washer.

They are often found populating roadside verges en masse and along the edges of drain lines. These grasses are drought tolerant and prefer good drainage, but at the same time thrive on the extra run-off water in the drain lines. They are also found on rocky hillsides. They are widespread in South Australia, Queensland, New South Wales and Victoria. On roadside verges in the mid-North en route to the Flinders Ranges they can be seen as a continuous carpet, after good seasonal rains.

It is a small grass with an upright tussock flowering in early summer whose flower heads grow to a height of 30 cm, starting as dark olive-green and gradually drying out to a light buff colour.

If you want to find out more about our native grasses, you can download Native grasses - a regional guide for rural landholders from our website.

Sea Nymph from Bunurong Marine National Park, Victoria (Photo: Mark Norman, Museums Victoria)

Seeking out the sea nymph

How good were the summer holidays? I spent most of my time with my daughter at the beach, constructing sand castles and combing through the sand for hidden treasures. Amongst the sand, we discovered a variety of different sea grass species. The questions that my daughter asked me were: What is seagrass? Why is it on the beach? What does it do? This encouraged me to think about how little we know about some of our native sea grasses.

The Adelaide metropolitan coastline has seen a huge decrease in seagrass 'meadows' over the past sixty years. Seagrasses such as Sea Nymph, *Amphibolis antarctica*, are flowering plants that grow in the waters off Adelaide's coastline. They're not just food and habitat for marine sea life; they also anchor the sand to the ocean floor. Just as vegetation on land protects soil from erosion, the thick network of seagrass roots (rhizomes), traps and protects the sand and mud of the sea floor.

One of the key roles they play are to slow water movement, allowing sand and other suspended particles to settle on the sea floor. Without seagrasses, the clarity of sea water is greatly reduced and sand is more easily eroded. Seagrasses play an important role in protecting our coasts from storms and wave action. Seagrasses will often be washed onto the shore after a storm event or during the colder months.

Sea Nymph is found from north-western Australia through to Wilsons Promontory in Victoria. It grows in shallow waters where it can access light in order to photosynthesise. It is a fragile seagrass that suffers greatly from the pumping of stormwater, wastewater and industry pollution into Gulf St Vincent.An excess of nutrients in sea water provides favourable growing conditions for algae which can suffocate seagrass. Algae also attaches to seagrasses, causing the leaves to become heavy and break off from the stem.

For more information on seagrasses, please visit the Coast and Marine section of the Natural Resources Adelaide and Mounty Lofty Ranges website.

A Wallaby Grass tussock (Photo: John Tann) and (inset) fluffy seeding head (Photo: Harry Rose)

Ballerinas in your garden

There are around 14 different species of Wallaby Grass, a widespread group of native grasses in the genus *Rytidosperma* prominent in grasslands and woodlands.

Wallaby Grasses are perennial plants (lasting at least three years), most active in winter and flowering in spring to early summer. They are great at attracting beneficial bugs, such as Ladybird Beetles and Green Lacewings, and they are palatable to livestock. As they are also frost and drought tolerant, they make an excellent choice for your garden.

They range in size but typically have thin, flat leaves 15 to 35 cm long, a flowering stalk up to 60 cm long and distinctive white to off-white seeding heads with green or purple tinges. If you use your imagination, you might agree that the white top seedlings with their 3 rings of fluffy white hairs look like a ballerina in a tutu, with wispy hair and long legs!

For other local native plants suitable for the Adelaide and Mount Lofty regions, check out the Adelaide Gardens Planting Guide or the South Australian Plant Selector.

References:

- naturalresources.sa.gov.au/files/sharedassets/adelaide_and_mt_lofty_ranges/land/native-grasses.pdf
- environment.sa.gov.au/goodliving/posts/2017/11/native-grasses
- keys.lucidcentral.org/keys/v3/scotia/key/Plants%20and%20Fungi%20of%20south%20western%20NSW/Media/Html/Rytidosperma_caespitosum.htm
- Harry Rose, flickr
- https://commons.wikimedia.org/wiki/File:Lobed_Wallaby_Grass_tussock_(6498347001).jpg

Coolatai growing in NSW (Photo: John Tann)

Not very Coolatai

September is Biodiversity month, which is not only a great time to celebrate the diversity of our State's native flora and fauna but also to reflect on the impacts of pest plants and animals; particularly on why it is so important to control them.

One of the pest plants we often hear about across the Adelaide region is Coolatai grass (Hyparrhenia hirta), a species originating from South Africa. Coolatai is one of the few perennial grasses that can easily invade otherwise undisturbed natural ecosystems because it produces very large quantities of seed in a short time. This seed germinates and grows in a range of different temperatures and soil types. It is also a lot more resilient to heavy grazing by livestock than native species, so it can survive in paddocks and farmland where less resilient native species may not.

Another reason this weed can outcompete native plants is its tolerance to both drought and fire. When these extreme weather events occur many native plants are unable to survive or regenerate. If they do regenerate the process tends to be slow. The extra time it takes native plants to grow provides more than enough time for the hardy Coolatai to germinate and rapidly grow, often completely taking over the available space and excluding natives.

As if this wasn't enough, Coolatai can also have a negative impact on our native fauna. When it grows and takes over the natural woodlands or grasslands, it reduces the natural habitat available for many native animal species; particularly ground dwellers such as lizards, insects and small mammals.

Visit our website for more information about this and other pest plant species.

Key words: Habitat loss, competitive relationship, effects of introducing new species

References:

- https://www.naturalresources.sa.gov.au/
- https://weeds.dpi.nsw.gov.au/Weeds/Details/179

Scented Lemon Grass (Photos: Jeremy Gramp)

Perfect LEMedy to treat the winter blues

Scented Lemon Grass, *Cymbopogon ambiguus*, is a perennial native evergreen grass in the Gramineae family. When crushed, it gives off a strong citrus odour, similar to lemon. The stalks and leaves can be used in tea or as a fragrant flavouring in sauces, marinades, cakes and curries. Why not try adding it to a simmering soup during the next cold winter night? It is also an important medicine plant for Kaurna miyurna (Kaurna people). After correct preparation, the leaves are used as an inhalant, and soaked, dried plants as a liniment to remedy fevers, flus and aches.

Scented Lemon Grass is found mainly in northern parts of South Australia, but it is also distributed within the southern Mount Lofty Ranges, particularly around watercourses. It is a great indigenous plant to include in native gardens. It is drought resistant and copes with moderate frost; two factors particularly suitable for Adelaide's summer and winter seasons. Scented Lemon Grass grows to between 30 cm and 2 m high, has lovely bluish, green-grey leaves with fluffy seed heads and a lemon scent. It is a popular choice for ground cover, rockeries or areas in the garden that are difficult to water. It provides habitat for local native fauna, like skinks and other lizards, so it makes a great addition to natural learning spaces both within and beyond the school yard.

To find out more about how you can establish a native, wildlife friendly garden, visit this link or contact your local NRM Education Officer.

References:

- Botanic Gardens of South Australia - Plant Selector
- Atlas of Living Australia - Cymbopogan ambiguus
- Tucker Bush - Cymbopogon ambiguus
- Aboriginal Uses – of our Wildflower Walk plants brochure

Caltrop seed capsules or 'burrs'. (Inset: burrs embedded in a shoe) (Photos: Jeremy Gramp).

Groundcovers

Caltrop - a right pain in the arch!

Have you ever had a flat tyre on your bike and when you looked at it discovered a large spiny prickle embedded in the rubber? If so it's more than likely that you have ridden over a patch of Caltrop.

Caltrop is a summer growing weed introduced from southern Europe. It has long stems that grow flat along the ground. The flowers can be either yellow or white, opening in the morning and closing or shedding their petals that very afternoon.

One of the major problems with the plant is that the seed capsules or 'burrs' contain 2 or 3 incredibly sharp spines up to 1cm long. They look like a three-cornered jack on steroids!

Not only are they a nuisance to bike riders, but if stepped on with bare feet they can cause a very painful injury. Livestock too can be quite badly injured by the Caltrop burr. In fact the name Caltrop is derived from the Latin *calcitrapa* which means 'foot-trap'.

Caltrop seeds germinate in several batches throughout the summer, which makes control very difficult. Adding to the problem is that the seeds remain viable in the soil for many years.

A helpful video with further tips on identifying caltrop and techniques for controlling it was produced and funded by the Adelaide and Mount Lofty Ranges NRM Board. It can be accessed here.

When you are riding to school this Friday - for National Ride2School Day - make sure you keep an eye out for any Caltrop that may be growing along the edges of the bike path.

Pigface showing pink flower and reddish-purple fruit

The survivor of the sands

The Pigface is a coastal groundcover with large green succulent leaves that survives in harsh conditions. It grows to ankle high with a spread of around 2 metres. Like many coastal or desert-like plants, the Pigface stores water in its leaves and if you cut them open you can squeeze out salty liquid.

There are many species of Pigface throughout the world; some have become weeds in Australia so if you ever plant any make sure you have the right species. The local species, *Carpobrotus rossi*, has a pink flower which distinguishes it from the weedy species, such as Angle Pigface, *Carpobrotus aequilaterus*, and Hottentot Fig, *Carpobrotus eduli*.

The fruit of the native Pigface is reddish-purple and, according to Neville Bonney's recent book Knowing Growing Showing, it and the leaves are eaten by Aboriginal people and can be used in a range of recipes.

Pigface is also important for wildlife, particularly the Stumpy Lizard (also known as Sleepy or Shingleback) which regularly eat the fruit.

Pigface is a survivor and is great for schools wanting to learn more about bush foods. It can also teach us about the adaptations of coastal and desert plants which need to survive in hot sand with very little moisture.

Plants like this one can also be linked to broader environmental issues such as coastal conservation, ecosystem disturbance and even desertification.

Today is World Day to Combat Desertification, an ideal opportunity to get some Pigface into your school and look at environmental issues using a global perspective.

Muntries in flower

A native apple a day.....

Muntries, *Kunzea pomifera*, are a native ground cover, occurring in the understorey. They are beachcombers. For them, life's a beach!

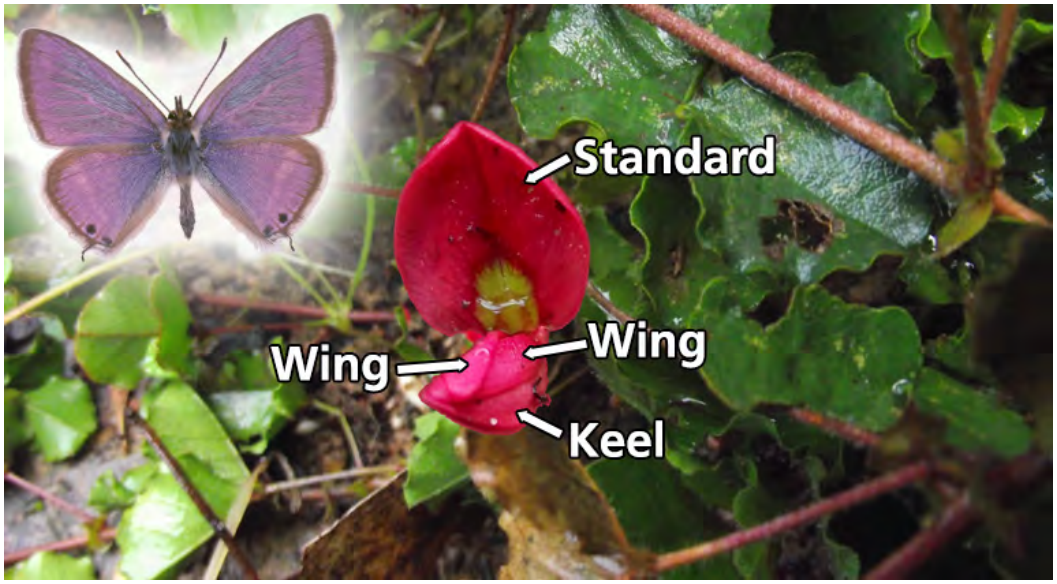
Muntries are commonly found in coastal areas comprising sandy soils, for example on sandy parts of the Barossa Valley floor, which was once an ocean seabed. This is where muntries thrive, still yearning for the beach!

Muntries fruit ('munterberries') are tasty, around the size of a pea, and have an apple flavour. The photo shows their showy creamy flowers in late spring; fruit ripens in January.

Muntries can be successfully trellised. They are quite long-lived, and as a ground cover they put down roots from their long horizontal runners.

Munterberries were collected mainly by Aboriginal women and eaten raw in summer, mushed up as a paste, sundried and stored for later consumption, or cooked into a sweet and/or savoury pie. Commonly used in contemporary bush tucker cuisine, especially for jams and tarts.

Another modern use is in local tea varieties, adding the dried berries for a distinctive flavour.



The spectacular Running Postman (Main photo: Steve Walker, Butterfly inset: Butterfly Conservation SA Inc.)

This plant will have you seeing red this spring

Running Postman, *Kennedia prostrata*, also known as the Scarlet Runner, is a vigorous ground runner with pale green leaves, which spreads up to 2m and forms a sea of large pea flowers throughout spring. The flowers are a typical "pea" shape consisting of 4 petals; the "standard", the "keel" and two "wings" (see photo). The flowers are a vibrant lipstick-red colour with a bright yellow centre.

This beauty was once common throughout the coastal dunes system, across the Adelaide plains and right up into the woodlands of the Adelaide foothills. Sadly, now it is much depleted and original populations are restricted to a few reserves. This is also sad news for the Pea Blue Butterfly, as the Running Postman is one of its larval food plants.

However, the eye-catching flowers make the Running Postman a popular choice for cottage, bush, formal or contemporary feature gardens in rockeries and, particularly, large garden pots. So if you're keen to attract butterflies to your garden space whilst adding a splash of colour, why not consider planting Running Postman? Check out Bringing Back the Butterflies for more info.

For other great local native plants that support our local wildlife, search the plant catalogue for your suburb.

References:

- Australian Native Plant Society
- Bagust, P., and Tout-Smith, L., The Native Plants of Adelaide
- Local Plant Catalogue, Natural Resources - Adelaide and Mount Lofty Ranges

You don't see many flowers in these colours! (Photo: Fritz Geller-Grimm)

Ap-PEA-ling plants for your school garden

You might have heard that 2016 is the International Year of Pulses, and here at NRM Education we like to keep our finger on the pulse with such things- so this week we bring you some handy information about one of our many native pea species.

The Black Coral Pea (*Kennedia nigricans*) is native to Western Australia but has also naturalised across some of the eastern states, including South Australia. It is a close relative of Running Postman, which you may have seen mentioned in a digest last year - or even already use in your garden. Both are beautiful creeping groundcovers, but the Black Coral Pea stands out because of its eye-catching black and yellow flowers. These appear during spring and summer, at a time when a lot of other plants are not flowering, so they will keep your garden attractive all year round.

One of the great things about this native pea is its tolerance to dry conditions, and the fact it doesn't need a lot of watering; it actually prefers hot conditions and thrives in full sun. The only places where we wouldn't recommend you plant it are areas which get substantial amounts of frost during the colder months.

Because of their bright colours and easy maintenance, these make a fantastic addition to school gardens - but watch out, they do take up a lot of room, up to 6 metres in fact, so don't plant them too close to other species, especially larger trees, as these will block the sunlight the plant needs to grow.

If you do decide to incorporate this species into your school garden, be on the lookout for bugs as it is also an insect-attracting plant. All in all it makes for a wonderful experience for children to have these types of plants around them, as they can really immerse themselves in nature and celebrate the Year of Pulses!

Creeping Boobialla in landscaping along Frome Road (Photo: Amy Blaylock)

Boobialla a boon for biodiversity

World Soil Day on 5 December celebrates the importance of soils as a critical component of the natural system and a major contributor to food, water and soil security.

Creeping Boobialla, *Myoporum parvifolium*, is a great groundcover to grow in your garden if you want to boost biodiversity and improve soil health.

Native to a number of bioregions in South Australia, including Southern Lofty, the attractive white, pink or pale purple flowers provide nectar for birds and butterflies.

Creeping Boobialla also provides shelter for lizards, and is popular in landscaping for its frost, drought, salt and fire tolerance once established, its adaptability to a range of soil types, its ability to suppress weeds and stabilise soils, and for its low water requirements.

There are excellent local resources available to help you identify which groundcovers are native to your area and attract wildlife to your garden.

References:

- Natural Resources Adelaide and Mt Lofty Ranges – Adelaide gardens: a planting guide
- Adelaide Botanic Gardens - Plant Selector
- Butterfly Conservation SA – Butterfly nectar plants
- Meredith Nursery

Keywords and phrases: plants provide shelter; adaptation; food webs.

Scented Sundews have sticky leaves that trap invertebrates (Photos: Rob Wallace)

Who's eating who? The dark secret of the Scented Sundew

The Scented Sundew, *Drosera whittakeri*, is a curious perennial plant that grows in moist places, generally in the wetter months of the year and dies back to its underground tuber in summer. It is easily identified by its rosette of spathulate or spoon-shaped green, red or yellowish leaves with sticky glands. Between May and November it has white flowers on long stalks and you can often find sundews growing together in a group.

If you touch the leaf with your forefinger and then touch your finger on your thumb and gently pull them apart just a few millimetres, you will notice clear, sticky strands adhering between both digits.

These interesting looking plants have a dark secret. Look closely at the leaves and you will see small insects and other invertebrates stuck to the plant's leaf glands. These plants are carnivorous, related to the Venus Flytrap, and the adhesive substances from the leaf glands helps to trap and dissolve the invertebrates. The sundew extracts the nitrogen from the captured animals to supplement the food it produces during photosynthesis.

The sundew family has 80 species across the world, with 70 of these found in Australia. There are about six species of sundews in the Adelaide and Mount Lofty Ranges region. Some are climbers, one has a V-shaped leaf and some, like the Scented Sundew, are rosette-shaped and ground hugging.

While the sticky substance dissolves insects, your fingers are made of tougher material and should be okay.....or will they be? You can always wash them!

References:

- Flowering Plants in Australia. Edited by BD Morley and HR Toelken
- Plants of the Adelaide Hills. GRM Dashorst and JH Jessop

Bog Clubmoss is a critically endangered species in South Australia (Photo: DELWP (Ian McCann))

This clubmoss is not bog standard

Clubmosses are members of an ancient plant family that were around when dinosaurs roamed the earth. Throughout the world their spores, leaves and roots have been used in pyrotechnics, photography, dyeing and medicine. With International Plant Appreciation Day fast approaching (April 13) it's a good time to get up close and personal with a local species, the Bog Clubmoss (*Lycopodiella serpentina*).

This strange plant creeps along the ground and prefers continuously saturated peaty soils, so it is only found in a few places in our region, such as the wetlands of the Fleurieu Peninsula. The Bog Clubmoss is classified as critically endangered in South Australia. You may never come across one in your lifetime, but if you do – look but don't touch - because one of the risks to their continued survival is illegal collection for the ornamental horticulture trade.

Other threats include being trampled by livestock, changes in water regimes, competition from taller plants and loss of habitat.

To find other larger and more common plants to give your appreciation to, have a look at one of our Plant ID charts.

Keywords and phrases: Food webs; habitat loss; effects of human activities; living things live in different places.

References:

- Atlas of Living Australia
- Bog clubmoss fact sheet
- Native plants of the AMLR
- Voyageur Country

Bower Spinach a fleshy groundcover in the same family as Pigface (Photo: Kym Murphy, Friends of Tennyson Dunes)

This spinach deserves to take a bow

Next time you visit one of Adelaide's metropolitan beaches, keep an eye out for Bower Spinach (*Tetragonia implexicoma*); a groundcover in the same family as Pigface, and commonly found along the South Australian coastline. As the photograph above shows, Bower Spinach contains a thick network of fleshy leaves and stems, providing a fantastic habitat for insects and reptiles wanting to keep cool and stay hidden from predators. Bower Spinach is also an adept climber and can often be seen climbing over neighbouring low-lying and medium-sized bushes.

Like its relative Warrigal Spinach, a bush tucker staple, Bower Spinach's high vitamin C content was employed by early European sailors who used it to prevent scurvy and it was also a valuable leaf vegetable for indigenous Australians.

Bower Spinach is in the family Aizoaceae. Members of this family are sometimes called 'ice plants' due to salt crystals, resembling frozen water crystals, which can be found on the undersides of the leaves. However, the invasive weed species Mesembryanthum crystallinum, is also in this family and most commonly called the Ice Plant, so take care not to confuse it with Bower Spinach.

Bower Spinach is a hardy plant that enjoys full sun and is tolerant of dry and salty conditions. It is found commonly along sand dunes, rock ledges, coastal bush land and cliff edges. Flowering occurs from August to November and the red berries, which can be used as a source of dye, darken to black once ripe.

References:

- http://vro.agriculture.vic.gov.au/dpi/vro/vrosite.nsf/pages/sip_bower_spinach

Dichondra repens in grey box grassy woodland (Photo: Amy Blaylock)

Creeper carpets and cushions

The ground layer of grassy woodlands is made up of a range of lilies, grasses, orchids, ferns, mosses and herbs. Each has its own adaptation to our climate, with some only visible above ground or actively growing while there is moisture in the soil. One such plant that grows right along the surface is *Dichondra repens*, commonly known as Tom Thumb or Kidney Weed.

Repens means 'creeping' in Latin and describes the habit of this plant. The creeping stems form nodes as they grow and at these points they set down roots.

You might have seen the small green kidney shaped leaves in your lawn or in a shady patch of your garden, as well as in grasslands and woodlands. Tom Thumb is common throughout South Australia, and is found in every state except the Northern Territory.

It can be grown between pavers, along the edge of rock walls, used as a lawn or grown in pots to create a backdrop for imaginative mini-worlds. You can even grow it as a living cushion!

Keywords: Features of plants and animals, adaptation

References:

- Grey box grassy woodland ground layer ID chart
- Seeds of South Australia
- Gardening Australia

A Southern Grass Dart feeding on the nectar from a Small-fruited Fanflower (Photo: Jeremy Gramp)

Your biggest fan

The Small-fruited Fanflower, *Scaevola albida,* is a great plant to grow in your backyard. Local to the Adelaide hills and plains region, it is a hardy ground cover preferring full sun. The white or purple flowers are in a fan shape, hence it's common name. The plant can be grown in pot plants, including hanging baskets, and is a favoured host and nectar plant for the Meadow Argus butterfly. This means that the adult butterfly lays its eggs on the plant, as well as drinking nectar from the flowers. Many other local butterflies also use the flowers to source nectar.

The Small-fruit Fanflower can be found at most local native plant nurseries or you can try taking a cutting. The benefit of taking a cutting is that the new plant will be genetically identical to the plant you took a cutting from (parent plant). The cutting should be 10 - 15 cm long, cut just below a leaf node, the point where the leaf connects to the stem, and the leaves removed from the bottom two thirds of the cutting. It's best to take your cutting in the morning when there's the most moisture in the plant, as the sun can easily dry it out. You can use root hormone or honey on the end of the cutting. Put the cutting in a pot with soil and keep it moist and in full sun. It should take about four weeks to grow roots.

Key words: Living things depend on each other, Features of animals and plants.

References:

- https://butterflyconservationsa.net.au/butterfly/meadow-argus/
- https://theplanthunter.com.au/howto/propagating-native-plants-with-nancy-shaw/

Orchids

Nodding Greenhood, Pterostylis pedunculata, one of the greenhood group of orchids

A unique group of wildflowers

If you have ever strolled through the scrub on your school property or within a conservation park, you may have been lucky enough to spot some orchids. Orchids are small wildflowers that grow from underground tubers and have unique and specialised relationships with pollinators and fungi. They can also indicate the health of a natural ecosystem by their diversity and abundance.

There is an orchid flowering every month of the year within South Australia, but it is between April and November that the most spectacular display of colours occurs. Depending on the species, orchids grow from either a single or multi stem – sometimes both. The leaves are arranged either as singular, double, around the stem (basal) or as multiple leaves along a stem. Orchids can live for many years and, because the tuber can remain dormant, they may not produce a flower or a leaf each year.

If you take a close look at the flowers you'll see that they are made up of a large lower petal called the lip or labellum, two lateral (side) petals and a column (the reproductive organ) between the petals. They also have two or three outer sepals that look like petals but are a different type of modified leaf. This arrangement of sepals, petals and the column is what separates them from other types of wildflowers.

Some orchids rely entirely on just one species of bee or wasp to pollinate them – without pollination they cannot reproduce. Interestingly, some sun orchids can pollinate themselves! Orchids also rely on a soil fungus to grow. These relationships with fungi are called mycorrhiza and they are also important for many other Australian plants.

One of the most common groups of orchids in the Adelaide and Mount Lofty Ranges region is the greenhoods, which get its name from the hooded flowers. Despite the name, not all Greenhoods are green; some have shades of red, brown, orange and white.

If you find orchids, make sure you stop to admire them but also be careful where you tread as many are rare and play a very important part in the ecosystem. You can download the NRM Education Native orchids of the Adelaide Hills ID chart from our website.

The mysterious Fire, Red-beak or Undertaker Orchid (Photo: Rob Wallace)

An orchid with a heart-shaped leaf that has a love for fire

When walking in the bush have you ever seen large, heart-shaped, fleshy green and red blotchy leaves growing in groups often in sandy or gravelly soil that never seem to do anything but be leaves?

Chances are they are the leaves of the Fire, Red-beak or Undertaker Orchid. The reason you rarely see these orchids flowering is because they usually need fire to set off the flowering process. In some areas they seem to flower regularly without fire but this is the exception rather than the norm. They need a hot wildfire rather than a cool burn to stimulate mass flowering.

They usually flower between August and November. The flowers are maroon and white-striped and number between two and eight on a single stem. A rare white form also exists. When the flower heads die off and dry they can turn black while retaining the form of the flower, hence another name they are given - Black Fire Orchid.

Little is known about what pollinates them; however it is believed they can self-pollinate.

You can download the NRM Education Native orchids of the Adelaide Hills ID chart from our website.

References:

- Electronic Flora of SA
- South Australia's Native Orchids, 2011. R.J. Bates
- Start with the Leaves – a simple guide to common orchids and lilies of the Adelaide Hills, 2011. Robert Lawrence

Veined Helmet Orchid (Photo: David Mangelsdorf)

You're so vein-ed, I bet you think this article is about you

The Veined Helmet Orchid, *Corybas diemenicus* (syn *Corysanthes diemenica*), is on show in the coming months, providing a loving display with its tiny heart-shaped flowers, coloured with dark red veins and a toothy fringe.

The name "*diemenicus*" is derived from Van Diemen's Land, the old colonial name of Tasmania, from where the plant was formally described. Since its botanical description there is still little known about this small wonder, but it is threatened by weed invasion, grazing, site disturbance, and climate change as it suffers in drought.

You may have to look closely for this little gem; as a single 1-2 cm plant could fit under a 5 cent coin. July and August are the perfect months to try and catch a glimpse of the flowers in the Adelaide Hills, Kangaroo Island, and if adventuring in Victoria or Tasmania. It's a rare orchid, found in colonies (clusters) hugging the ground in damp areas of dappled shade.

For children who enjoy a treasure hunt, the Veined Helmet could form part of the activity, searching for orchids shown on the NRM Education Native orchids of the Adelaide Hills ID chart. Many orchids in the Adelaide Hills flower in winter and spring.

References:

- http://saseedbank.com.au/species_information.php?rid=1206
- http://wpvherbarium.biosciences.unimelb.edu.au/flora/Corybas/diemenicus/
- https://www.environment.gov.au/system/files/resources/24a21f05-8239-4b11-b8b7-8dc5a7a6f0d1/files/fifteen-threatened-orchids.pdf

Key words: seasons; weather; adaptation; classification; habitat loss; water cycle; effects of human activities; features of animals and plants; climate change.

The Spotted Donkey Orchid, not to be confused with a spotted donkey (Photos: Jason Tyndall (orchid), Steve Walker (donkey))

How do you spot the Spotted Donkey Orchid?

When out and about in the Adelaide Hills you are more likely to spot a Spotted Donkey Orchid (*Diuris pardina*) than a spotted donkey. This plant can be identified by the 3 cm flowers with large brown blotches around the edge of the yellow petals that hang down in pairs - a little like donkey ears. It has up to ten flowers and rises to 40 cm in height. It is also known as the Leopard Orchid due to its distinctive marks.

Most orchids are epiphytic, which means they grow on host plants such as trees. Some orchids are lithophytic; growing on exposed rocks. However, the Spotted Donkey Orchid is terrestrial; growing on or in the ground. Terrestrial orchids are found in a range of habitats from sandy dunes and desserts, to boggy valleys and damp forests, and often form large colonies. The Spotted Donkey Orchid forms a colony consisting of underground tubers. Different orchid species flower throughout the year, and every month there is an orchid to search for in our local region. Now is the perfect time to begin the hunt for the Spotted Donkey Orchid.

The Spotted Donkey Orchid and many of our other local orchids are shown on our Native orchids of the Adelaide Hills ID chart. As with many of the orchids on this chart, the Spotted Donkey Orchid is endemic to (only occurs in) Australia.

References:

- http://www.oznativeplants.com/plantdetail/Leopard-Orchid/Diuris/pardina/zz.html
- http://www.projectnoah.org/spottings/38388182
- http://www.gardens.si.edu/come-learn/docs/template_orchid_where%20is%20my%20home.edit.pdf
- http://www.orchid-care-tips.com/terrestrial-orchids.html

Key words: classification; features of animals and plants; adaptation; seasons; lifecycles; living things live in different places.

The Common Midge Orchid showing the tubular leaf wrapped around the stem (Photo: Robert Lawrence)

Pretty fly for an orchid guy

The Common Midge Orchid, *Genoplesium rufum* (also known as *Corunastylis* sp. Adelaide Hills), gets its name from the insect that pollinates it; the Midge Fly.

It is believed that the orchid attracts the flies with its nectar and the flies pollinate the orchid in return. This is an example of a mutually beneficial relationship. Once pollinated, the Common Midge Orchid develops several non-fleshy capsules containing large numbers of seeds. The tubular leaves are hard to see as they wrap around the stem, which grows to around 10 cm tall.

One of the threats to this small orchid is the chance of being overgrown by other more vigorous weed species. This is true of many smaller plants, so management techniques include controlling nearby weeds.

The Common Midge Orchid is one of the earliest orchids to flower in the Adelaide region – it can be seen from February to May - so get out there with our Common native orchids of the Adelaide Hills ID chart to find one while they're still in flower.

Key words: Seasons; Features of animals and plants; Mutually beneficial relationship; Lifecycles; Adaptation; Living things depend on each other; Food webs; Classification; Effects of introducing new species.

References:

- http://plantnet.rbgsyd.nsw.gov.au/cgi-bin/NSWfl.pl?page=nswfl&lvl=sp&name=Genoplesium~rufum
- www.johnwamsley.com/april26.html
- http://openjournals.library.usyd.edu.au/index.php/TEL/article/view/8127
- https://nossa.org.au/tag/midge-orchids/

Rabbit Ears Sun Orchid (Photo: Jason Tyndall)

Here comes the sun

With bright lemon-yellow flowers that show their glory on warm sunny days, the Rabbit Ears Sun Orchid (aka Lemon Sun Orchid), *Thelymitra antennifera,* is one of our insect-pollinated spring orchids which flowers particularly well after fire events.

As with many other orchids, the Rabbits Ears Sun Orchid produces seeds, but it also has the unusual ability to form new colonies from tubers grown on the end its roots.

To find this orchid look for long thin leaves with a red tint at the bottom, then hunt for the yellow flowers that are 2-4 cm across, up to 20 cm off the ground. This orchid has a small column (the section in the middle of the petals) with two red lobes at the top. When you've found it give it a whiff – you'll be rewarded with its lemony or vanilla scent.

To identify this Rabbit Ears Sun Orchid and many others, use a copy of NRM Education's Common native orchids of the Adelaide Hills ID chart. This orchid usually flowers from mid-August to mid-November.

Key words and phrases: seasons; weather; classification; adaptation; lifecycles; features of animals and plants.

References:

- http://fe.yarraranges.vic.gov.au/Residents/Trees_Vegetation/Yarra_Ranges_Plant_Directory/Yarra_Ranges_Local_Plant_Directory/Lower_Storey/Orchids/Thelymitra_antennifera
- https://www.naturalvaluesatlas.tas.gov.au/downloadattachment?id=14590

The distinctive Purple Cockatoo (Photo: Jeremy Gramp)

In a purple patch

The Adelaide Hills is a major part of one of 15 nationally recognised biological hotspots, identified by the Australian Government Threatened Species Scientific Committee. This is acknowledgment of the high biological diversity within the Adelaide Hills.

NRM Education has a series of Identification charts that can be used to identify plants, animals and fungi found throughout the Adelaide Hills. Spring is a great time to use our Common native orchids of the Adelaide Hills chart because the diversity of orchid species is higher in areas of high rainfall, and the winter rains provide ideal growing conditions for orchids, many of which flower in spring.

At this time of year look out for the Purple Cockatoo. The middle of its flower looks like a cockatoo's beak, hence the unusual name. This orchid is pollinated by native bees. It has a sweet perfume smell and a distinctive colour and petal arrangement, making it easy to identify.

The Purple Cockatoo Orchid exists as an underground tuber throughout the hot and dry months then grows rapidly in winter before flowering in spring. After flowering the orchid withers and enters a period of dormancy.

Native orchids are not typically found in farmland or in roadside vegetation so a great place to see them flowering is in one of the National Parks located throughout the Adelaide Hills. Why not head out to see which orchids you can find in your area?

References:

- https://www.ahc.sa.gov.au/environment/biodiversity
- http://www.environment.gov.au/biodiversity/conservation/hotspots
- Orchids of South Australia

Senna artemisioides petiolaris

Shrubs, herbs and climbers

Sennas are “happy chappies.”

Sennas, also commonly called Cassias, are small to medium, round, local native shrubs growing from 1m to 2m in height, depending on species and soil type. They occur on poor soils, such as calcareous limey sands, and love full sun, tolerating our harsh summer conditions well.

They brighten up the bush and tend to smile a lot, especially in October and November which is ‘party time’ when they come out in swathes of yellow flowers!

Birds eat the fallen seed but ants eat only the arils, helping to disperse the seed.

There are four common subspecies of *Senna artemisioides* in SA, namely *artemisioides*, *coriacea*, *filifolia* and *petiolaris*. The photos above are of the *petiolaris* form, which boasts needles rather than leaves.

With National Tree Day and winter plantings coming up, it is worth remembering to plant a ratio of approximately ten shrubs to every tree to mimic natural conditions.

You can see some good examples of Sennas at Barossa Bushgardens regional native flora centre, Research Road, Nuriootpa.

Christmas Bush, Bursaria spinosa

Christmas comes early for this bush

The Christmas Bush or Sweet Bursaria, *Bursaria spinosa*, is a medium to tall shrub and acts like a hitchhiker: it is often the only local shrub still standing on country roadsides!

Christmas Bush takes its name from its prominent sprays of sweetly perfumed, creamy flowers leading up to Christmas. It is a smart tactician - why would you want to flower in spring when everyone else is? Steal the show and flower at Christmas instead!

This is a really beneficial shrub; it is a host plant for the tiny *Trichogramma* wasp which kills light brown apple moth larvae, hence a natural control of one of the main pests in SA vineyards. The female wasp lays eggs in the moth eggs and, when the wasp eggs hatch, the larvae devour the developing caterpillar inside the moth egg! Neat!

Christmas Bush flowers are great for biodiversity because they are insect-pollinated, provide nectar for butterflies and attract a wide variety of insects. In turn, these insects attract a suite of different bird species, which is all good in the scheme of things.

It is sometimes called 'rattle bush' because of the way the two tiny seeds rattle in their purse-shaped capsule in autumn. Long-lived and hardy, it will grow on a range of soils and on Kangaroo Island it can grow into a small tree!

Plant in clumps at one metre spacings and tip-prune each autumn to grow a denser shrub.

Black Anther Flax Lily (inset photo: Reiner Richter)

This plant is a real pick-me-up

The strappy green leaves of tussocky Dianella clumps typify the understorey of Adelaide's original bushland and remind us of what Adelaide's open woodlands would once have looked like at ground level.

Dianella clumps occur naturally beneath the canopy of our gum trees, and typically spread laterally as they age, becoming a large tussocky mass of upright leaves up to a metre in height. Large ageing clumps can be reinvigorated after 10 years or so by shaving them off at shin height with a brushcutter in the winter months when they are dormant.

Three species of Dianella occur in the Adelaide region. *Dianella revoluta* (Black Anther Flax Lily) is the most commonly occurring species and has many electric blue tiny flowers on long stalks in spring. They are finding new uses as a hardy edging plant along the borders of paths. *Dianella longifolia* is a foothills species, now rare, and *Dianella brevicaulis* occurs in coastal areas.

Dianellas had several traditional uses:

- juice from the berries was drunk to combat colds
- roots were scraped clean, chewed and eaten as a 'pick-me-up' or to alleviate colds
- the leaves, which are quite strong, were collected, split and twisted for making ties and in basket-making.

Birds, including Bronzewing Pigeons, and lizards seek out its seed, and it is a nectar source for bees, other insects, and honeyeaters.

Yaccas are known for their beautiful flowering display

Is the Mount Lofty Grass-tree a grass or a tree?

Commonly known as a Yacca, the Mount Lofty Grass-tree, *Xanthorrhoea quadrangulata*, is neither a grass nor a tree – it is a herb. If it was a grass it would have leaf blades and if it was a tree it would have a wooden interior with vascular rings (what you can see when a woody tree or shrub is cut down).

It is endemic to South Australia, so it naturally occurs nowhere else in the world.

Distinctive characteristics of all Yaccas are their long hard leaves, black trunk, and large flowering stalk which can grow to several metres high.

Although they may take up to 10 years to flower from seed, their flower is a very valuable food source for birds such as honeyeaters, Silvereyes and wattlebirds, as well as insects such as butterflies, moths and native wasps.

Locally, there are two types of Yaccas, which you can easy tell apart by cutting the leaves in half. The secret to remembering which is which is in the botanical names; *X. quadrangulata* has four sides when cut and *X. semiplana* has two sides that resemble a semi-circle.

When you are next exploring the mountainous areas of the Mount Lofty Ranges have a closer look at the Yaccas.

This week we celebrate International Mountains Day to raise awareness around the importance on mountains to a sustainable future; so it's an ideal time to go for a bushwalk in the Mount Lofty Ranges.

Old Man's Beard

The gentle old soul of the bush

This scrambling native climber, *Clematis microphylla*, is a show pony in spring. It is easily recognisable by its sprays of cream flowers in August which turn into small woody seed clusters attached to masses of fluffy off-white winged feathers, hence its name, 'Old Man's Beard'. The feathers assist in seed dispersal by the wind.

Old Man's Beard has three traditional uses:

- the leaves were warmed or bruised and then applied as a poultice for rheumatism and skin sores - the poultice was laid on as a 'counter-irritant' which allegedly got so hot you forgot about the original complaint!
- long fibrous roots were cooked on hot coals, then beaten into dough
- stalks were used as a binding for stone tools.

Seed clusters with their fluffy white wings provide nesting material for birds, habitat for butterflies, and the plant's bushy foliage provides sheltered habitat

Old Man's Beard is long-lived, and will naturally use other shrubs as a step-ladder. A great design idea is to plant it at the base of shrubs or small gums and watch it clamber up them to grab the spotlight! This is exactly how the plant thrives and survives in nature, by finding a host plant to climb up.

Another great idea is to plant it at the base of fences or a trellis and watch it climb!

Old Man's Beard is not as vigorous as Native Lilac, *Hardenbergia*, or ivy and won't destroy its host plant. It is a gentle soul.

Native Bluebells (inset: Hoverfly feeding from a flower) (Photos: Jeremy Gramp).

Blue blooms

Trees and shrubs are often the focus of biodiversity plantings in school native gardens, however there are some spectacular understorey plants that should also be considered. One such group of plants is our Native Bluebells or *Wahlenbergia* species.

Native Bluebells are perennial or annual herbs, growing from 5 – 90 cm high, depending on the species.

The outstanding feature of the plants is their mass of electric blue flowers. Although the flowers are relatively small, 1 – 4 cm across, their sheer number creates a wave of blue in the garden.

One of the key characteristic that makes the plants desirable in a native garden is that the flowers hang around for long time. If the conditions are right flowers have been known to last for 6 months. Generally flowering occurs from early spring through summer to early autumn.

These flowers not only look pretty but provide a food source for a large variety of creatures, including Blue-banded Bees, hoverflies, butterflies and numerous native wasps and ants. Flower and Crab Spiders are also found sitting on the petals waiting to hunt insects as they come to feed on the flower.

These plants provide ample opportunities for students to investigate all these creatures.

If you would like to find out more about our local native plants and what actions students can undertake to improve biodiversity in your local community, then visit the terrestrial habitat section of our website. Here you will find units of work and numerous teacher resources. If you would like additional information about creating native gardens then check out the Urban biodiversity page.

"Callistemon sieberi" by Melburnian - Own work (digital photograph by author). Licensed under CC BY 3.0 via Wikimedia Commons

Slightly droopy but with beautiful stamens

Named after botanist Franz Sieber who visited Australia in the 1830s, *Callistemon sieberi* is a tall shrub, typically growing to a height of around 3 m. It has sharply pointed, narrow leaves and the branches droop slightly.

They grow in moist, well-drained soils or wet bogs, such as around creeks, dry rocky river beds and gullies. In spring and early summer they develop beautiful clusters of cream, pale-yellow or pink flowers which form cylindrical spikes that are shaped like a bottle cleaning brush, hence the common name River Bottlebrush. The genus name *Callistemon* comes from two Greek words calli and stemon, meaning beautiful stamens.

The flowers are a major source of food for numerous nectarivorous birds, butterflies, native bees and other insects, so they are a valuable addition to a biodiversity garden. The flowers and their capsules can also be used in craft activities.

They are a great feature shrub, are suitable for growing in large containers, and are fantastic as screening plants, especially in moist or wet areas. They are adaptable plants that can also tolerate periods of dryness, so they are suited to low water, low maintenance gardens.

An added bonus is that they're also considered low allergen plants, so shouldn't pose a problem for people who suffer from asthma, hay fever or dermatitis.

Correa reflexa hedge in the CFS Fire-wise Garden, Barossa Bushgardens, Nuriootpa

Cor! 'ere's a cute shrub

Correas are cute little shrubs, with several uses in an urban garden.

Firstly, they are an excellent choice for a shady or semi-shady situation, as they occur naturally in the understorey beneath overhanging trees.

Secondly, they may be hedged to create a formal statement (e.g. bordering a lawn or defining a fence line).

Several species occur in the Adelaide and Mount Lofty Ranges, notably Common Correa, *Correa reflexa*, and Salmon Correa, *Correa pulchella*.

They generally have green or red tubular flowers and are a great source of nectar for honeyeaters in winter.

Sticky Hop Bush (Photo: Jeremy Gramp).

Hop to it in the bush!

Sticky Hop Bush, *Dodonaea viscosa*, is a hardy, spreading shrub that varies in height from 1 m to 4 m. It naturally grows on the dunes near the coast throgh to the mallee, and in the Blue Gum Woodlands of the foothills. The flowers of the sticky hop bush are very small (about 3 mm) and are hard to see. If you look carefully, you might be able to see the reddish-brown structures in clusters on the ends of branches in spring and early summer. The leaves are green and glossy and have a slightly sticky texture.

In springtime, the fruit of the plant creates one of the most distinctive sights in the Australian bush. The fruit forms in masses of reddish or purple hop-like fruits with four 'wings'. The fruit begins to split when ripe (normally during the summer months) to reveal a small, black, round seed. Birds, in particular parrots and pigeons, will actively seek out the seeds.

The smoke from Sticky Hop Bush was thought to be used by Aboriginal people for pain relief. In the Dreaming Story of Tjilbruke, Tjilbruke's nephew Kulultuwi had been killed near the Sturt River at Marion. His body was taken to a place near Brighton, where he was smoked and dried in accordance with ancient tradition. It is thought that the smoke was produced using the leaves from the sticky hop-bush. The 'hops' from the Sticky Hop Bush were used by early settlers to brew beer.

Given its hardy nature, Sticky Hop Bush is a great plant for school gardens. It can be easily grown from seed and is likely to withstand some 'battering' from students. A great plant for sensory gardens due to the sticky and glossy nature of the leaves.

References:

- Bagust, P. & Tout-Smith, L. (2005) The Native Plants of Adelaide, Urban Forest Biodiversity Program.
- Berkinshaw, T. (2009) Mangroves to Mallee, Greening Australia (South Australia).
- Sticky Hop-bush fact sheet (accessed online 17 July 2014) The Urrbrae Wetland.

Native Lilac (Photo: Jason Tyndall)

In a bit of a purple patch

If you're lucky enough to have the versatile Native Lilac (*Hardenbergia violacea*) in your home or school garden, you may remember the moment you first heard the 'patter' sound as their seed pods popped open and sent seeds across the garden!

Also known as Purple Coral Pea, Happy Wanderer or False Sarsaparilla, this attractive twining plant is commonly found across the Adelaide plains and can be identified by its dark, leathery green leaves and distinctive sprays of purple pea flowers.

Native Lilacs will happily climb up fences or other plants nearby, and it is ideal for creating tunnels, archways, dens and screening. In the absence of something to climb it will develop into a small shrub.

The perfect plant for attracting native birds and the Common Grass-blue Butterfly, their flowers range in colour from royal purple to pink and white.

Native Lilacs begin to bloom from late winter through to spring, with their seed pods ripening, drying out and popping open from late spring!

The beautiful flowers of Totem Poles (Photo: Jason Tyndall)

This shrub takes pole position

Melaleuca decussata is a large shrub that grows 2- 4 metres tall.

The shrub has small blue-green leaves and light purple 'bottle-brush' flowers in late spring to summer.

Insects and birds are attracted to the flowers.

Its common name, Totem Poles, comes from the grey woody capsules that are embedded in the stem.

This shrub is commonly found in high rainfall woodlands in South Australia and Victoria.

This shrub provides excellent shade and can be pruned.

For other great local native plants look at the Adelaide gardens – a planting guide or Coastal gardens – a planting guide and other resources on our website.

Reference:

- The complete guide to the vegetation of temperate South Australia, mangroves to mallee by Todd Berkinshaw.

The beautiful Lavender Grevillea (Photo: Jeremy Gramp).

Keep Australia naturally beautiful

This week is Keep Australia Beautiful Week. From 24-30 August 2015, Keep Australia Beautiful reminds all Australians what an amazing and beautiful country we have. However, it won't stay beautiful if we don't clean up our act when it comes to litter. No one wants to live in a community blighted by discarded litter, so we all need to do our bit to encourage people to think twice before dropping their rubbish.

Another way that we can help to beautify our community is using the amazing floral displays of our local native plants. One such plant is the Lavender Grevillea, *Grevillea lavandulacea*.

It is the most common of the three naturally occurring Grevillea species that we have in Adelaide. There are a number of species available in nurseries that are introduced from interstate, along with hybrids and commercial cultivars.

However, planting a local Grevillea like the Lavender Grevillea is important as it was once the most common of the three local species, and it is now very much restricted in its range, occurring in far fewer places that it once did.

The plant is a prostrate shrub, spreading to a width of about 1 m but is generally only 30 – 50 cm tall. The highlight of course is its distinctive flowers. The flowers vary in colour from a light pink through to a crimson red, mostly flowering in spring, however the occasional flower can be found at any time throughout the year.

The flowers are an important food source for a range of nectar-eating birds, including honeyeaters and spinebills. A range of native insects also rely on the flowers for food.

If you are interested in sourcing the Lavender Grevillea for planting in your school grounds you can contact one of the native plant nurseries on this list.

If you would like to discover other local native plants that historically occurred in your part of Adelaide, and therefore are perfectly suited to your site, then this interactive vegetation mapping tool is a great place to start. For further assistance contact your local NRM Education Office.

The glorious Gold Dust Wattle (Acacia acinacea)

The 'must-have' plant for your grounds?

During the cold, gloomy days of winter, the vibrant yellow flowers of wattles are a joy and reminder that spring is on its way. For school or preschool communities the Gold Dust Wattle (*Acacia acinacea*) really is the must-have plant to grow. This sturdy shrub grows to a compact 2m height and width, has no spikes, small round phyllodes (the word to describe what looks like leaves) and is covered by a mass of yellow, honey-scented flowers at a time when few other plants dare to bloom. Children will see butterflies, birds and native bees drinking nectar from the flowers and towards the end of spring and into summer seed-eating birds and insects will visit to feast on the shiny black seeds that are ejected from the pea-like pods. There will be seed left over for children to collect and try to grind into flour using flat round stones. The damper made from these seeds was an important food source of the Kaurna people living on the Adelaide plains, and was higher in protein and fat than the bread we eat today. Acacias growing in your grounds provide an authentic learning context that brings learning to life for students from preschool to senior secondary, with connections to most learning areas. Examples include using seeds as an ingredient in a range of recipes, developing a business case for commercial production of acacias, experimenting with germinating seeds using smoke water and scarifying (scratching) versus untreated seeds, and exploring the acacia's connection with the great cricket contest we call the Ashes. Further examples of learning experiences with local plants and animals are available for primary and secondary: (F-2), (3-6) and (7-10).

Many students who undertake inquiries about local animals and the plants that provide habitat move into the taking action stage and create their own habitat at school that includes acacias. These kinds of projects are a wonderful avenue for students to develop critical and creative thinking, personal and social capability and ethical and intercultural understanding. Another string to its bow is that Gold Dust Wattle is a hardy plant that would be an asset to any nature play space; flowers, leaves, pods and seeds inspire imagination, and a hedge or grove of these plants creates the ideal boundary for quiet spaces.

If you agree that the Gold Dust Wattle is a must have for your yard then contact your local native plant supplier and enjoy those wonderful masses of yellow flowers during the winter gloom.

Seaberry Saltbush (Photo: Wildseed Tasmania)

Eat your shiny greens

November is World Vegan Month, kick-started by World Vegan Day on Sunday 1 November. In Adelaide, the Vegan Festival is being held on Saturday 7 November in Victoria Square (Tarndanyangga) and it is a great day dedicated to celebrating, promoting and providing education on living a healthy and sustainable vegan lifestyle.

The vegan lifestyle relies on plants as the main food source. A locally indigenous plant used as a food source is the Seaberry Saltbush (R*hagodia candolleana*). This dense shrub stands up to 2 metres tall with thick, succulent, shiny green leaves which are reported to have been cooked and eaten by local Aboriginal people.

There are differing opinions as to the edibility of the berries, so caution should be used if planting where children could pick the inviting red fruits.

This coastal plant is often found on cliffs, dunes and inland, so have a look for it with your class while exploring other indigenous plants in your area. You can find out which other native plants can be found in your suburb using the local plant catalogue.

References:

- en.wikipedia.org/wiki/Chenopodium_candolleanum
- barwonbluff.com.au/bluff-life/dune-plants/seaberry-saltbush/

Clasping Goodenia (Photo: www.flickr.com/photos/sunphlo/5488091613)

What smells like wee and attracts native bees?

Globally, 2.5 billion people do not have access to proper sanitation, including toilets, and this has dramatic consequences on human health, dignity and security, the environment, and social and economic development. To highlight this issue, the United Nations recognises November 19 as World Toilet Day. The theme for 2015 is 'Sanitation and Nutrition'.

A genus of Australian native plants which has an interesting link between sanitation and nutrition is *Goodenia*. There are 200 different species of *Goodenia* and almost all are restricted to Australia and offshore islands.

They are typically fast growing and are usually small scrambling shrubs or prostrate ground covers, growing to a height of about 2.5 metres, depending on species.

One interesting characteristic of *Goodenia amplexans* (Clasping Goodenia) is that is has a strong odour of cat wee! Goodenias are also particularly important nectar plants for native Blue-banded Bees, which are also fantastic (buzz) pollinators of crops such as tomatoes. If you plant Goodenias alongside your vegies you may attract these bees, which could give you a greater yield.

Goodenias are also great plants to grow in a sensory or native garden due to their bright flowers, which are typically yellow, white or blue-white, and the fact that they grow in a wide range of soil conditions, have low water requirements, are often fast growing, and low maintenance once established.

One of the local native Mistletoes and (inset) a close-up of the fruit (Photos: Jeremy Gramp)

The hitchhiker's guide to the Viscaceae

National Ride2School Day on Friday 4 March is the perfect time to get your school community actively walking, scooting or riding to school. So encourage everyone to hitch a ride, just like Mistletoe.

Mistletoes are parasitic plants 'hitching a ride' or living off a host plant. Australia has approximately 70 species of native Mistletoe, from three different families (Santalaceae, Loranthaceae and Viscaceae), which feed off the sap of other native plants such as Sheoaks and Eucalypts.

Wherever there is Mistletoe you'll find Mistletoe Birds and honeyeaters. Throughout Australia these birds play an important role in the distribution of the Mistletoe seeds. After eating the fruit the seed passes through the bird in just 10-15 minutes and the sticky seed attaches to a branch of the host tree. Within a day or so a quickly growing tendril emerges from the seed, releasing a cocktail of enzymes which create a small hole in the outer bark of the branch. The tendril probes its way through the hole down into the sappy tree tissue until it hits the water and mineral-rich plumbing of the tree. The Mistletoe is then able to grow rapidly using some of the host's water and minerals.

Mistletoe is often associated with Christmas, which is fitting as many types of Mistletoe continue to flower in drought or during winter, so they are sometimes the only local source of nectar, fruit and pollen during these hard times. Mistletoe fruits are packed with sugar and carbohydrates, making them a vital source of nutrition for a variety of animals, including koalas, possums, butterflies and other insects, and numerous bird species.

References:

- www.abc.net.au/science/articles/2004/03/05/2044992.htm
- www.smh.com.au/national/the-mistletoe-its-as-australian-as-the-gum-tree-20111221-1p5nr.html

Groundsel is a great nectar plant for hoverflies, butterflies and native bees and wasps

A little ray of sunshine

Draws a crowd and creates a buzz of helpful activity.

The Cotton Groundsel, *Senecio pinnatifolius*, has the distinction of being one of the first plants to flower in winter, with masses of bright yellow flowers. By flowering in July it is a good month earlier than our wattles.

This early blossom bonanza has several implications. Firstly, it is a host plant for a variety of insects such as hoverflies, which are good to have around our vegie gardens. Adult hoverflies feed on pollen and nectar of flowering plants so they may help with pollination of veggies, whilst the larvae are predatory, preying on plant-sucking insects such as aphids and thrips. Many species of aphids are common pests of a range of vegetables and other garden plants, so their management in gardens benefits from hoverfly presence.

A second implication is that when solitary native bees first emerge from their nests in late August when conditions are warmer they'll have a food source in full swing providing nectar and pollen.

Cotton Groundsel could make a bright addition to any garden insectarium. An insectarium is simply a range of different species planted adjacent to your veggie garden to optimise the chances of ongoing pest control by creating a 'reservoir' of beneficial insects, all of which have pests of their own but which don't attack the veggie garden plants.

An insectarium is a good thing to have as it increases the biodiversity of an area (i.e. the number of living species there), allowing beneficial insects to build up their numbers.

Flowers, scents and pollen are attractive to a range of insects and the most attractive ones to native bees and hoverflies are blue, yellow and white-flowered plants. Groundsel is also a nectar plant for butterflies and native wasps.

A Twiggy Bush-pea at Sturt Gorge (Photo: Amy Blaylock)

Red and orange in grey attracts blues

The Twiggy Bush-pea (*Pultenaea largiflorens*) is a low shrub that is indigenous to many areas of South Australia. Across the Mount Lofty Ranges it is part of the understorey of grey box grassy woodlands that you'll find in local parks such as Sturt Gorge and Belair. These woodlands are nationally threatened, so please keep to marked trails when you enjoy them.

Flowering in spring, the showy orange and red pea flowers of this shrub provide food for the caterpillars of the Fringed Heath-blue butterfly. You will have to look hard to find the larvae as they are well camouflaged in colours of green, brown or orange-red. When in bloom, the nectar attracts adults of the Common Grass Blue, Long-tailed Pea Blue and the Fringed Heath-blue, and you can find their photos on the Butterflies of the Adelaide region identification chart.

You might have remnant Twiggy Bush-peas growing in your garden, or you can grow them in a well-drained drier position on soils ranging from clay to sand.

If you live in a grey box woodland area, use our identification charts to find the common ground covers, shrubs and trees that you can add to your garden to provide diverse habitats and food for local wildlife.

References:

- Natural Resources Adelaide & Mt Lofty Ranges Plant Catalogue
- Butterfly Conservation SA
- Botanic Gardens of SA Plant Selector

Dog and Briar Roses are now bushland weeds

An environmental weed that is a rose by any other name

June 12 is Red Rose Day and while many people think that red roses are romantic and pretty, they have a darker side.

Like so many other plants that early settlers brought with them to put in their gardens, once those areas were abandoned, the roses went wild and spread through the bush becoming yet another weed that we have to try to remove from bushland.

There are two species of rose that persist in bushland. They are the Dog and Briar Roses. The Dog Rose is also a problem in pastures and as such is now a declared plant in South Australia, which means it cannot be sold or moved and is required to be controlled by landholders if they are on a property, in bush or pasture.

Why are introduced plants a problem in bushland? They out compete native plants; altering habitat and making it unsuitable for native animals. Some also change the fertility and pH of the soil or have exudates that stop native plants growing.

While it is easy to introduce plants that become weeds there is a huge cost environmentally and financially, and trying to return bushland or pasture back to what it was is a costly and often impossible task.

Maybe next year we should celebrate Silver Banksia Day and appreciate the important part that banksias play in providing habitat and nectar for animals including birds, insects and the cute and elusive pygmy possum.

Kangaroo Thorn is a dense screening shrub (inset: Blue wrens and honeyeaters need dense shrubs for their survival)

A prickly customer

The bird magnet Kangaroo Thorn, *Acacia paradoxa*, is a 'tough love' mother. Beneath her harsh exterior lies a heart of gold, as she selflessly protects the small woodland birds, skinks, lizards and insects beneath her skirts.

Kangaroo Thorn is habitat heaven for blue wrens (Superb Fairywren) and other small woodland birds which love the safety of its dense, prickly foliage to nest and feed in. It provides a shady refuge and master bedroom for kangaroos to sleep under during the day where they scrape out a shallow dustbowl to lay in. Foraging kangaroos will nibble the tips in summer when there is precious little other food around and they may attempt to bonsai the shrub!

All understorey plants, including shrubs such as wattles, provide a sheltered microclimate, minimizing extremes of temperature and wind, as well as contributing to the accumulation of leaflife (also known as 'leaf litter').

Shrubs do this by trapping the falling leaves of taller eucalypts, preventing them from being blown away by the wind, as well as contributing their own dead leaves to the equation. Leaflife is so important for three reasons:

- it is 'soil in the act of becoming', it breaks down into rich soil
- it is habitat for all sorts of wildlife, not just bugs, worms and insects
- it is nature's sunscreen, protecting bare ground and minimizing soil moisture loss, so important in the context of a warming climate.

So plant this shrub if you want to help nature help herself and attract small native birds such as wrens and honeyeaters. It is an excellent screening shrub, typically growing to 2 m or taller and spreading even wider.

Ruby Saltbush berries come in a variety of colours (Photo Jeremy Gramp)

Ruby Saltbush Tuesday

Have you ever considered growing Ruby Saltbush at your school? It is one of the most versatile plants and has a multitude of uses in a school setting. It is a vigorous small shrub that can reach a height of 1 metre, however is often less than half this height occurring as a groundcover. In this situation, the prostrate dense mat does a brilliant job at suppressing weeds. It has small fleshy cylindrical leaves with a covering of fine hairs, giving the plant an attractive grey appearance.

When you change with every new day: A key feature of the plant is the succulent berries which grow to about 5 mm in diameter. They start off green, then turn yellow, orange and finally red. It is usual for the differing colour stages to be present on a plant at the one time. Importantly the plant can offer fruit for most of the year, which is critically important for animals that eat the fruit. This includes many species of birds, such as Silvereyes and White-plumed Honeyeaters and a variety of insects. Ants in particular have been recorded carrying away the berries. Humans are not left out either. The berries can be picked and eaten raw; having a salty sweet flavour that is quite refreshing.

Yesterday don't matter if it's gone: If you are exploring cultural connections, then this plant has both indigenous and early European links. The fruit of the plant is traditionally used by many Aboriginal groups from all over Australia, being eaten as a snack. Early European settlers and explorers in Australia boiled the leaves to eat as a greens substitute.

Dyeing all the time: The plant can be a great addition to a sensory garden and another a popular activity is to crush the fruit and use the resulting dye in art or face painting.

While the sun is bright: Finally, another great feature of the plant is that it is extremely easy to propagate. Just collect the mature fruits, dry them in the sun and wait for the fleshy part of the fruit to dehydrate and wither away. What you are left with is mostly seed which is then very easy to germinate.

If you would like additional information about creating native gardens, including a list of native plant nurseries, then check out the Urban Biodiversity page of our website.

The elegant Tall Scurf-pea (Photo: Gawler Regional Natural Resource Centre)

More peas please

The Tall Scurf-pea (*Cullen australasicum*) is our final native pea in this UN Year of Pulses. It is a medium-sized shrub, with long, elegant stems topped by pinkish-purple flowers. The overall shape of the flower is typical of the plant family Leguminosae, which contains all the familiar pulses we eat; chickpeas, lentils, peas and beans, as well as 18,000 other species!

This open shrub, growing up to 1.5 m high by 2 m wide is an important nectar plant for birds and butterflies but it is now listed as rare in the Adelaide region. It is also a caterpillar host for the Long-tailed Pea Blue, Chequered Swallowtail, and Common Grass-blue butterflies. The Chequered Swallowtail will only lay its eggs on Cullen species, so it is extremely important to have these plants if we want to continue having these beautiful butterflies in the wild and in our gardens.

Why not go exploring to see which of these butterflies visit your home or school? To help in identifying which butterflies you are looking at, download our Butterfly ID chart.

The Tall Scurf-pea is a great addition to native and butterfly gardens - the stunning flowers remain on the plant for a long time, and though fairly short-lived, it is good at self-seeding.

References:

- http://www.nrcgawler.org.au/product/cullen-australasicum/
- http://saseedbank.com.au/species_information.php?rid=1293
- 'Attracting Butterflies to your Garden: What to Grow and Conserve in the Adelaide Region' by Hunt, Grund, Keane and Forrest 2007

Keywords and phrases: plants provide shelter; seasons; lifecycles; living things live in different places; living things depend on each other; features of animals and plants.

Coastal Lignum's tangled stems provide important habitat for birds

Fedge your bets

The Coastal Lignum (*Muehlenbeckia gunnii*) is a scrambling climber, capable of reaching over 4 metres. It is a great plant to grow in biodiversity gardens and natural learning spaces, as it can hide chain-link fences and other structures to create a drought-tolerant fedge – something between a fence and a hedge.

This plant is found along much of South Australia's coastline, where its tangled stems provide important habitat for birds. The yellow-green flowers are easy to miss, being small and only slightly lighter in colour than the leaves, which are an oval to hastate (spear) shape. The fruits are much easier to spot, turning orange when ripe, and providing food for lizards and birds.

There are records of Aboriginal people treating digestive ailments with a tea made from the plant's leaves, and one of its common names is Native Sarsaparilla, suggesting that Europeans also used it to make a drink. Collecting seed is easy, and nearly all the seeds should germinate; collect the fruit when ripe and place into a bucket of water overnight, then rub the flesh off the hard, black seeds.

Try planting the seed at school and grow your own Coastal Lignum fedge.

References:

- www.prospect.sa.gov.au/webdata/resources/files/Prospect_Booklet_web_Final.pdf
- www.tennyson.org.au/assets/gardens.pdf

Key words: Plants provide shelter; Living things depend on each other; Features of animals and plants; Aboriginal and Torres Strait Islander knowledge

The Garland Lily is actually a native species (Photo: Loraine Jansen, Friends of the State Herbarium of South Australia)

Pink, purple, perfect, purpureum

At this time of year, many of us lock ourselves indoors, snuggle under a quilt and dream of warmer days spent at the beach. It is easy to forget the repressive heat of a summer spent in Adelaide. The South Australian Mediterranean climate typically means that we receive our share of rain over winter but when summer arrives we are often pouring copious amounts of water onto our plants to ensure they are kept alive. Plants that have been planted over winter can become stressed and die if they are not watered adequately throughout their first summer in the ground. The general rule for watering native plants, is to water less often but with a greater amount of water (6-10 litres per plant), to encourage the root systems of the plant to establish and draw moisture from deeper in the soil profile.

One of the benefits of choosing local native plants for your home or school garden is that they are well adapted to the seasonal nature of the Adelaide environment and don't require large amounts of water to survive after the first summer. Native plants are incredibly diverse with different species flowering at different times of the year. So, with a little planning, a native garden can be created to include flowers that add a splash of colour throughout the year. The Pink Garland Lily (*Calostemma purpureum*) is a great example of a beautiful summer flowering plant. This lily pops up out of the earth and adds an impressive array of purple and pink to the scorched wheat-brown colour that much of the surrounding countryside has turned. It is a particularly spectacular site along rural roadside verges as the vibrant purple flower contrasts against the bare paddocks. As you may have guessed, the Garland Lily is dormant for much of the year, flowering over late summer/early autumn. It is typically found within the higher rainfall areas of the Adelaide Hills, the Fleurieu Peninsula and the foothills. However, it has been recorded as far north as southern Queensland and the semi-arid region of northern South Australia. It is also commonly found throughout the New South Wales Riverina District. The Garland Lily grows well in shaded areas and temperate forest. It is an annual plant that belongs to the same family as the introduced Daffodil, Belladonna Lily and Nerines. For those looking to attract butterflies, the Garland Lily is an excellent addition as a nectar plant.

For more information on native plants that may be right for your garden, please visit the State Flora website and the Know Our Plants blog.

References:

- http://avh.ala.org.au/occurrences/search?taxa=Calostemma+purpureum#tab_mapView
- https://www.anbg.gov.au/gnp/gnp7/callostemma-purpureum.html

Common Heath flowers vary from white to deep pink (Photos: Steve Walker)

Pretty in pink…or scarlet…or white

April 13 is International Plant Appreciation Day so why not learn about one of our local natives, such as the Common Heath? This medium shrub which grows in bushland throughout the Adelaide Hills is tolerant to frost and is found in the warm to cool temperate heathland and open forest in the south east of Australia; including New South Wales, Victoria, Tasmania and South Australia. It is the floral emblem for Victoria.

Common Heath is an evergreen, retaining its leaves throughout the year, with flowers appearing autumn to spring. It grows one to three metres tall and has stiff branches with ridged leaves and clusters of flowers. The wintery, tubular bell-shaped flowers, which vary from white to deep pink, are great to add colour during the cooler months and to feed honey eating birds. They have an ericoid mycorrhizal root which means that the roots have mycorrhizal fungi in them which expand the root surface of the plant enabling it to take in more nutrients in nutrient poor soils.

If you want to grow Common Heath it is well suited to pots and requires moist, but well drained soil and will grow in sun to partly shaded areas. Common Heath is much harder to propagate than many other native plants. For example, the Common Heath's seeds should be stored in a cool, dark, dry place for 12-16 weeks before being planted in moist surface soil and germination can be anything from two months to two years, so it is often easier and more successful to use cuttings rather than seeds. Cuttings of 7-8 cm are snipped from late summer to late autumn and are best planted in soil covered by moss or gravel.

The root system can take 9-10 months to develop which is plenty of time to learn all about its benefits and importance in our ecosystem.

References:

- www.anbg.gov.au/gnp/interns-2013/epacris-impressa.html
- www.gardeningwithangus.com.au/epacris-impressa-common-heath/

Keywords and phrases: Classification, Features of animals and plants

The Twiggy Daisy-bush can be pruned into a tunnel or the edges of a maze

The ideal shrub for a natural playground

With 'Play Outside Day' coming up on May 4, it's a perfect time to show off a plant which is great for exactly that; playing!

The Twiggy Daisy-bush, *Olearia ramulosa*, is an ideal plant to use to create a natural play space for young children. The species name comes from the Latin rama meaning 'branch', signifying it's numerous small branches. Indeed the many small branches make this plant shrubby and hedge like, so with a pair of secateurs and some imagination you can prune this bush into a tunnel or a maze. What better place for children to play a game of hide-and-seek or simply enjoy exploring the garden from a different angle?

The Twiggy Daisy-bush is native to the Adelaide hills and plains, and is also an important food source for native butterfly and moth species (particularly the Crested Teatree Moth) which feeds on the nectar of the plant's small white flowers that appear throughout the year.

But wait, what is that sweet delicious smell? That would be the daisy-bush's strong aromatic scent, making it perfect for engaging the senses. Other native daisy bushes also have strong aromas. The Coastal Daisy-bush (Olearia axillaris) can be used in cooking as a native substitute for rosemary.

To find out more about how to plant the Twiggy Daisy-bush, or to learn about other native plants that are well suited to natural play spaces, check out the local native plants for play guide. Most importantly, don't forget to get outside and play!

References:

- https://steemit.com/food/@ligayagardener/aussie-bushfoods-coast-daisy-bush-olearia-axillaris-20171013t214027344z
- https://en.wikipedia.org/wiki/Olearia_ramulosa
- Native plants of the Adelaide Plains

An Eastern Spinebill taking advantage of the winter nectar provided by the Rock Correa (Photos: Jeremy Gramp)

This native plant rocks!

Water a Flower Day is held 30 May each year. Although it is traditionally a northern hemisphere celebration, we can join in too. The only downside is that at this time of year there aren't that many plants in flower in our region. This highlights just how important those plants that are flowering are to all of the animals that rely on them. If you want to increase animal biodiversity in your garden then having a food source all year round is essential.

One local plant in flower at the moment is Rock Correa, *Correa glabra*. The flowers are a tubular shape, 1 to 4cm in length and hang vertically. They can be green or yellowish, white, or pink to red with green-yellow tips. Flowering occurs from May to August and the flowers provide an excellent winter nectar supply for a wide range of honeyeaters, particularly the Eastern Spinebill and New Holland Honeyeater.

The Rock Correa is an erect dense shrub, growing 1 to 3 m high and with a similar width. It is almost entirely confined to rocky habitats, grows quite well in shade and can be pruned, so it makes a great hedge or low screening shrub.

An interesting feature to help with identification is that, when crushed, the leaves give off a strong, often pungent or sweet lemon smell. This is because the Rock Correa is in the same family as Diosma and Boronia, and all the varieties of citrus, which all have that characteristic smell.

If you are interested in learning to propagate plants via cuttings, Correas are a brilliant starting point. They are very easy to strike, with a high percentage of cuttings being successful. In fact, Correas are often easier to propagate using cuttings, as the seeds can be a challenge to collect and are also difficult to germinate.

For further ideas about native plants suitable for your local area, check out the range of native plant resources on our website.

Common Everlasting Daisy (Photo: Jason Tyndall)

I'm half crazy all for the love of you

Will you be joining the other preschools, kindergartens, primary and high schools across Australia taking part in National Schools Tree Day on Friday 27 July?

National Tree Day is Australia's largest tree-planting and nature-care event which lets you reconnect with nature and do something positive for your community and the environment. Since starting in 1996 more than 3.8 million people have planted 24 million plants. Individual events can be registered through the National Tree Day website where there is also information about organisations that can help with planning and support.

Planting water-wise, local native plants is preferable to introduced plants, as they are not harmful to our local landscapes and they attract local wildlife. One great example of a water-wise local plant is the Common Everlasting Daisy (*Chrysocephalum apiculatum*).

This plant naturally occurs within the grassy woodlands of the Adelaide plains and hills face, and is a fast growing ground cover. It features attractive silver-grey foliage and clusters of bright yellow daisy flowers, which appear from late spring to early autumn.

It is suitable for small gardens and rockeries or difficult to establish, steep slopes, preferring an open, full-sun environment. It doesn't require much watering and is a food plant for caterpillars, so it is likely to attract native butterflies and other insects.

For other local native plants suitable for the Adelaide and Mount Lofty region, check out the Adelaide Gardens Planting Guide or the South Australian Plant Selector.

References:

- https://www.naturalresources.sa.gov.au/files/sharedassets/adelaide_and_mt_lofty_ranges/nrm_education/native-plants-of-the-adelaide-plains-a3-gen.pdf
- http://plantselector.botanicgardens.sa.gov.au/Plants/Details/72

Hemi parasites like Cassytha glabella (L) and Cassytha pubescens (R) rely on their host plants for water and inorganic nutrients (Photos:Rob Wallace)

Hemi parasites, a cosy relationship - snotty gobble and friends

Dodder-laurel, Snotty-gobble and Strangle Vine, just some of the names for this group of hemi parasitic green string-like native plants in the *Cassytha* genus that resemble something from a sci-fi horror movie, slowly growing and wrapping themselves around, and sometimes strangling unsuspecting plant victims.

This genus is one of a number of hemi (or obligate) parasitic plants that live in bushland. Others include the Native Cherry and the many species of Mistletoe. Hemi parasites are able to photosynthesise to produce carbohydrates but rely on their host plants for water and inorganic nutrients. *Cassythas*, which for the most part are leafless, photosynthesise via their green stems.

Their seed is probably spread by birds and possums, which eat the fruit, then defecate the seed on plants they stand on. The seed which attaches to and germinates on the host plant has a haustorium, a root like disc which grows around and into the branch like an alien, and is able to extract water and nutrients from its host.

Snotty-gobbles and their brethren grow on a wide range of host plants from grasses to Eucalypts. They can smother their host plant, which in turn kills them, but this is less likely to happen when fire goes through bushland regularly, keeping the *Cassythas* in balance with their hosts.

While hemi-parasitic plants don't give much back to their hosts, they are an important part of their ecosystems, providing food through their berries for birds and other animals. Two local species of butterfly, the Blotched Dusky-blue and Western Dusky-blue, breed on these plants, with their larvae feeding on the buds, flowers and soft stems. If *Cassythas* smother their host plants it can open areas up to young plants, which supply food for the larvae.

May the Snotty-gobble be with you and your bushland!

Keywords and phrases: Life cycles; producers; consumers; adaptation.

(L) The Grass Trigger-plant and (R) a Reed Bee gets a whack on the back from the trigger (photo: Rob Wallaces and Greg Bourke (Twitter))

Keep that insect on the trigger

Many plants are dependent on invertebrates, birds and other animals for pollination. Their pollen is spread passively when the pollinator comes to feed on the flower and the pollen is rubbed on a body part through contact with the flower. The pollinator then moves to another plant of the same species and pollinates that plant as the pollen rubs off onto the flower they are seeking food from.

The Grass Trigger-plant, *Stylidium armeria* ssp. *armeria,* takes things a step further to ensure pollen is spread to other plants and that the said plant is pollinated. It has a trigger that is activated when a pollinator (an insect) lands on the plant. This trigger, which contains both female and male sexual parts, swings around hitting the insect and either giving or taking pollen in the process (Many plants don't have the female and male parts ready for reproduction at the same time, ensuring cross pollination).

Grass Trigger-plants have herbaceous lily-like leaves, with stems of attractive heads of pink four petalled flowers. They flower in spring and early summer. Trigger-plants grow in gravelly, sandy, well drained soils in the Adelaide Hills most commonly.

There are about 130 different trigger-plants worldwide, of which most occur in Australia.

The Grass Trigger-plant is used as an ornamental plant in gardens and can be a good bordering plant, adding lots of colour to a garden with its sprays of pink flower heads.

References:

- http://anpsa.org.au/s-gra.html
- http://fe.yarraranges.vic.gov.au/Residents/Trees_Vegetation/Yarra_Ranges_Plant_Directory/Yarra_Ranges_Local_Plant_Directory/Lower_Storey/Herbs_and_Groundcovers_1m/Stylidium_graminifolium

The Austral Trefoil usually flowers in spring, with delicate white to pink, pea-shaped flowers (photo: Nathan Johnson (Twitter))

Sow the seeds of possibility

The Austral Trefoil (*Lotus australis*) is a native species of the lotus genus, but not closely related to the classic aquatic plants associated with India and South-East Asia. These aquatic plants, which are commonly called Water Lilies, Water Lotus, Sacred Lotus or Indian Lotus, are in fact from a different order of plants. Instead, Austral Trefoil is as delicate herb that grows in woodlands and along the coast of most states in Australia. It can be identified by its white to pink, pea-shaped flower, usually appearing in spring. At other times of the year this perennial herb can die back, especially in periods of drought or frost, but it re-sprouts to its full height of 60 cm when conditions are more favourable.

Insects, including two local species of butterfly; the Grass Blue and Long-tailed Pea-blue, visit Austral Trefoil flowers to drink nectar. The butterflies also lay their eggs on them, with the hatching caterpillars feeding upon the plant. Using pesticides or removing the caterpillars is not a good idea if you want to support these butterflies.

May 30 is Water a Flower Day, which is a nice thing to do at any time of year, but particularly when planting natives in your school or garden. Austral Trefoil is available from local nurseries, but you might like to try growing them from seed. After the plant has finished flowering, seed pods will form and eventually turn brown and papery. The trick to harvesting them is waiting until they are fully mature, but before they split open explosively and throw their seeds on the ground. Better germination results are obtained when the seed is soaked in near boiling water first – why not conduct an experiment and use the results to learn about probabilities and statistics with your students?

If you're interested in recognising and creating habitat for butterflies, you might like to download our butterfly identification chart and taking action module.

References:

- https://www.greeningaustralia.org.au/wp-content/uploads/2017/11/FACT-SHEET_Lotus_australis.pdf
- https://butterflyconservationsa.net.au/plant/lotus-australis/

Flowers occur in clusters to help trap wind-borne pollen (Photo: Muriel Bendel)

Blowing in the Wind

Saturday 15 June is Global Wind Day. Why, you might ask, is wind so important? There are many reasons, one of which is its ability to help certain plants reproduce through wind pollination. Not all pollen carried by the wind will land in the right place, so this process is often thought to be less efficient than pollination by animals, but it does work for a number of native plants.

Adriana quadripartita, commonly known as Coast Bitter Bush, is one such species. These plants are dioecious, meaning male and female flowers are on separate plants. Once the flowers have bloomed, pollen from the male flowers is blown off and settles on the female flowers of neighbouring shrubs. The flowers grow in clusters, thereby increasing their capacity to catch the pollen.

Coast Bitter Bush is commonly found along the coast of southern and south western Australia and less commonly inland in the southern half of South Australia. It is often found close to the beach, particularly around sand dunes, and with the high exposure to coastal winds in these areas, its pollination by wind makes it well adapted to these areas. Consequently, it can be used as a protective screening plant to shield other species from salt spray.

Perhaps you can ask your students to find out some more about wind and how it interacts with our native plants, animals and fungi. Happy Global Wind Day!

References:

- https://www.bushtrackerownersgroup.asn.au/wildflowers/655+coast-bitter-bush
- https://bie.ala.org.au/species/http://id.biodiversity.org.au/node/apni/2888511
- https://sciencing.com/examples-wind-pollinated-flowers-5916512.html

The Sweet Apple Berry usually flowers in spring and summer. (Photo Jeremy Gramp)

A sweet spot for the Sweet Apple Berry

Do you have a sweet spot for bush foods? If so, the Sweet Apple Berry, *Billarderia cymosa*, may be the plant for you.

Bush foods are not only good for your health, with high levels of antioxidants, vitamins and minerals, but are also good for the environment. Planting local native bush foods can help to improve biodiversity by creating food sources and habitat for native birds, mammals, bees, butterflies and other insects. In addition, as with all local natives, they require very little water when compared to exotic plants. Many local nurseries sell bush foods. To find a nursery near you, look at the native plant nurseries list.

Planting bush foods also connects us with the traditional Aboriginal knowledge of our local area. The Sweet Apple Berry, for example, was a traditional food source for the Kaurna nation (Whiting 2018). It is a slender climber that produces sweet edible fruits. The fruits have a kiwifruit-like texture and a taste somewhere between aniseed and apple. They can be eaten raw, roasted or even sun-dried like a sultana.

This Sweet Apple Berry can be found in sandy coastal areas such as the Aldinga Scrub, in Mallee, or in Grey Box (*Eucalyptus macrocarpa*) woodlands, such as those in the Mount Lofty Ranges. Although once widely distributed, it is now a rare gem in urban areas.

Reference:

- Whiting 2018, 'Aboriginal Uses of our Wildflower Walk Plants', approved by Kaurna Warra Pintyanthi

Beaded Glasswort growing in the intertidal zone of the Onkaparinga River estuary (Photo: Jeremy Gramp)

Meet a halophytic extremophile

A halophyte is a plant that grows in areas of high salinity, most commonly near the ocean, but also in swamps, deserts or marshlands. These plants don't grow exclusively in these highly saline environments but do thrive in these areas because they have an ability to cope with the extreme conditions where there is also less competition from other plants.

One halophyte growing in our region is *Sarcocornia quinqueflora*, the Beaded Glasswort. Glassworts, or samphires as they are more commonly known, are unusual looking succulent herbs with jointed branches that resemble a string of beads. Interestingly, the term glasswort comes from medieval times when the ash from burnt samphire, which is very alkaline, was used in glassmaking. In the early days of the European settlement in South Australia a glassworker operated in the saltmarshes south of St Kilda.

Beaded Glasswort is a low spreading plant that grows from 'runners' forming a dense mat about 15 cm high. In some instances it may grow more erectly to about 50 cm. The plant changes colour seasonally and it is one of the most common samphires in our region. It is edible, with the fresh upper part of the stems being the most tender to eat. It can be eaten fresh, pickled, steamed and blanched.

Beaded Glasswort meadows are recognised as providing important habitat for several estuarine species, including migratory shorebirds and, importantly, for the endangered Orange-bellied Parrot.

If you would like to learn more about our local samphires download the guide to Samphires of the Adelaide and Mount Lofty Ranges region

Left: The tubular flower (Photo: D Muirhead); Right: Eremophila longifolia growing at Karalundi in Western Australia (Photo:Geoff Derrin)

Long-leafed desert lover

Eremophila longifolia is a hardy, grey to green native plant which grows as a shrub or small tree between one and eight metres tall. The species name *longifolia* means '*long-leaf*' and the plant develops an attractive weeping habit with age. Found in all mainland States, it is the most widespread species of the 260 species of *Eremophila* (all endemic to Australia) because of its ability to grow in an extensive range of soil types. Many of the *Eremophilas* are commonly known as Emu Bush, because Emus love eating their fruit and they even break down the seed coat via their digestive system; making them ready to germinate. Emus also disperse the seeds in their scats.

Good reasons to plant *Eremophila longifolia* would be to add a splash of colour to your garden and to attract native birds, especially honeyeaters, which are adapted to extracting the nectar from their long tubular flowers, which are creamy pink to brownish-red or brick. It will flower at any time of year, but mainly from June to December.

Eremophilas are adapted to dealing with long dry spells, even droughts lasting years, so they are well-suited to low maintenance gardens or those where water supply is limited. The name *Eremophila* is derived from Greek words meaning '*desert loving*'.

Eremophila display gardens can be found around SA, including at the Arid Lands Botanic Garden at Pt Augusta and Barossa Bushgardens at Nuriootpa. There are also *Eremophila* plantings at Adelaide Botanic Garden near the Wine Centre.

For information on local native plants suitable for SA conditions, see Adelaide gardens – a planting guide **on our website.**

References:

- Society for Growing Australian Native Plants S.A. Region 1997, Eremophilas for the Garden, Australian Plants Society Incorporated, Adelaide.
- Chinnock, RJ 2007, Eremophila and allied genera: A Monograph of the Myoporaceae, Rosenberg Publishing, Dural, NSW

The Slaty Sheoak showing female seed cone and male flowers on the same plant. (Photo: Rob Wallace)

Sheoaks aren't always female

The Slaty Sheoak, *Allocasuarina muelleriana*, is a shrub to 2 metres which often grows in sandy, quartz soils. It is closely related to the more common Drooping Sheoak.

The name Sheoak comes from two sources. The She part relates to the native American tree the Sheac or Beefwood, and the oak part comes from its similarity, in wood grain, to the English Oak.

Sheoaks, of which there are 91 different species in four genera, are trees and shrubs. They are native to Australia, Southeast Asia, Malesia, Papuasia, and the Pacific Islands.

Most plants have both the female and male parts in the same flower but the Slaty Sheoak has separate female (red ball) and male (rusty brown long) flowers, sometimes on the same plant and sometimes on different plants. The bottom line is that not all sheoaks are female, some are male, and some have both sexes on the same plant. The fertilised female flower turns into a cone containing the seed.

Sheoaks are well adapted to our dry, warm climate as they photosynthesise primarily through their green furrowed branchlets which are waxy and as a result lose little moisture. The modified leaves are minute teeth that are located in a ring at the segment ends along the branchlets.

Sheoaks fix nitrogen from the soil through nodes of symbiotic bacteria called Frankia which are attached to their root system.

References:

- Cox, P., & Freeland, J. 1969. Rude timber buildings in Australia. Thames and Hudson.ISBN 0-500-34035-8
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Developing fruits on a Blackberry plant (Photo: Steve Walker)

A berry big problem

European Blackberry was planted in colonial times as a food plant. However, the plant quickly spread, and it is now widely established as a pest plant in native vegetation and pasture. Blackberry is a declared plant in South Australia because it presents a significant threat to agriculture, the natural environment and safety. As such, landowners have a legal responsibility to manage blackberries on their property.

Blackberries are fast growing, sprawling shrubs that form dense thickets, which outcompete native vegetation, harbour pest animals like rabbits and foxes, and reduce land productivity in pastures. They also increase fire hazard because they contain a large amount of dead material in their thickets. Each plant has long spiny canes that can grow up to seven metres per year and they spread via sprawling canes and roots. New plants can also grow from seed spread by birds, mammals, water and recreation. A single berry can have up to 80 seeds!

It's not all bad though. As well as providing shelter for a range of feral animals, they can also provide shelter and protection for native animals such as the endangered Southern Brown Bandicoot. For this reason, it is important to assess the potential impacts on native animal and plant species before undertaking a Blackberry control program. Gradually replacing Blackberries with suitable local natives (such as Kangaroo Thorn in its natural area of distribution) and maintaining other good quality ground cover can help control the spread of Blackberry seedlings while still providing habitat for native animals.

Controlling pest plants and animals is one of seven key priorities of Green Adelaide.

If you're interested in our local plants and habitats you might like to download our Terrestrial Habitat Quality Assessment Teacher Information Pack.

Common Flat-pea (Photo: Jeremy Gramp)

Appreciating peachy-looking peas

Monday 13 April is International Plant Appreciation Day. Plants have a wide range of benefits, including providing us with shade, food, beverages and medicine, improving air quality and also being used for aesthetic purposes.

One aesthetic species to appreciate is the Common Flat-pea, *Platylobium obtusangulum*, a low spreading shrub typically found in forests, woodlands and heaths.

It has bright yellow flowers with red centres, the colours somewhat resembling a cut peach. The showy flowers, typical of the Fabaceae (formally known as Leguminosae) or 'pea' family', help to attract insects for pollination. As well as 'pea flowering' plants, the Fabaceae family has over 19,000 species including wattles, herbs, shrubs, trees and edible beans.

The Common Flat-pea is endemic to South Australia, Tasmania and Victoria. Look out for the bright flowers during spring and summer. The triangular or heart-shaped leaves can be quite variable, sometimes making it tricky to distinguish it from the other three recognised species of *Platylobium*. However, the Common Flat-pea is the only one that can be found in the Mount Lofty Ranges.

To find out about other local plants, check out our Native Orchids of the Adelaide Hills and Native Plants of the Adelaide Plains identification charts.

References:

- http://plantselector.botanicgardens.sa.gov.au/Plants/Details/5814
- https://bie.ala.org.au/species/http://id.biodiversity.org.au/node/apni/2913189
- http://anpsa.org.au/peas1.html

A volunteer working on Boneseed in greybox grassy woodland (Photo: Rick Coyte)

Seeds of bone bode no good

People love plants for many reasons – the beauty and perfume of their flowers, the colour and structure of their foliage, the way they attract butterflies and birds, the ease with which they grow in their garden. Boneseed (*Chrysanthemoides monilifera* ssp. *monilifera*) was introduced to Australia from South Africa as an ornamental shrub, and it seems like the perfect match for Adelaide. It is hardy, grows in a range of soil types, survives on very little water, reproduces with ease, and carries masses of bright yellow daisy flowers. So what's not to love?

Unfortunately, that list of attributes makes it an invasive plant in woodlands and coastal areas, and it is considered one of the worst weeds in Australia. Boneseed can grow to 1.5m tall and it can rapidly outcompete native vegetation such as grasses, orchids, lilies and groundcovers. A single plant can produce up to 50,000 seeds in a year, over half of which will germinate, but these seeds might stay in the soil for up to 10 years before they grow.

Landholders and bush carers across the region, particularly in the Adelaide Hills, work hard to control this and other pest plants to prevent them from spreading. Scientists have researched many management strategies in their fight against this invader – fire, physical controls, herbicides and even biological controls. Land managers then need to make decisions about which method will work best for their particular situation, and this work is continuous because of the seed bank.

If you would like to survey the weeds in your local area, try one of these weed identification charts. If you want to fight back and conserve our threatened remnant vegetation, you can remove declared weeds from your garden, substitute native plants with similar features, and volunteer with groups like Trees for Life or Friends of Parks.

Keywords and phrases: *Effects of introducing new species; Living things live in different places; Habitat loss; Effects of human activities; Competitive relationship; Lifecycles; Science informs changes in human practices*

She-oaks beneath 'the Old Gum Tree' at Barossa Bushgardens, Nuriootpa (inset: close-up of woody seed cones and needles in a female tree)

Tree of the Year 2500?

The Drooping She-oak, *Allocasuarina verticillata*, will be here long after we're gone and will be voted 'Tree of the Year' in 2500 because it's as tough as nails, loves a good drought, and is prone to hedonistic sunbaking.

The She-oak has a complex personality profile. It's the Jessica Watson of Australian plants; it can be a solo voyager, seen gracing a distant rocky ridgeline, but is equally at home as an understorey tree that knows its place as a team player nestled beneath the taller gums in a woodland setting.

Children love its segmented needles, which can be twisted apart and re-joined. It is often referred to as 'a lego tree'.

It might seem like a good plant for 'International Women's Day' but, despite its name, there are actually male and female she-oak plants. The female is easily recognisable by its attractive woody cones, which the male tree lacks.

She-oaks are used as a street tree in Tasmanian towns with stunning effect. Why should they have all the fun? She-oaks are ideal for schools as they don't drop large branches and only grow to around six metres.

Like wattles, she-oaks will discourage weeds beneath their canopies. Weeds stubbornly refuse to associate with this plant as they can't stand the She-oaks' beautiful needles dropping all over them and eventually choking them to death!

Plant in groves or chessboard style 3-4 metres apart to create a weed-free area (the build- up of leaf-litter takes about 5 years).

They're for the birds! Yellow-tailed Black Cockatoos (and the 350 threatened Glossy Black Cockatoos on KI) use them to prevent themselves becoming extinct... they eat the woody seed cones from the female tree.

Silver Banksia

Silver Banksia: the Good Samaritan of Australian plants.

Banksias provide precious food, in the form of nectar from flowers produced on cylindrical woody cones, in late summer and autumn when there is little else around. This critical shortage of autumn-flowering plants has contributed to the decline of nectar-feeding honeyeaters, insects, pygmy possums and sugar gliders, so plants such as banksias and mistletoes fill a very important niche in the ecosystem.

Imagine how you would fare not having any food from February to April each year!

Banksias typically prefer lighter, well-drained sandy soils. They grow 5 to 7 metres and can be very long-lived, some trees living for hundreds of years. Historically, they occurred as sacred groves of ancient trees with large trunks over a metre in diameter.

Several Aboriginal groups from around Australia obtain a sweet drink by soaking banksia blossom in water, which releases much of the nectar. This sweet drink is sometimes mixed with gum from Golden or Black Wattles before being drunk. The banksia cones are also used as strainers.

The Silver Banksia, *Banksia marginata*, gets its name from the silver underside of its leaves.

Golden wattle in flower

Go the green and gold!

Did you know that Golden Wattle, *Acacia pycnantha*, is Australia's floral emblem?

"This is the Golden wattle,
'Tis the emblem of our land,
You can put it in a bottle
Or hold it in your hand."
(author unknown)

Golden Wattle is a sprinter and a coloniser: it is one of the first species to spring up in bare or burnt patches of ground. Golden Wattle heralds the warmer spring weather and is generally one of the first species to bloom in August with masses of golden yellow flowers. This year Golden Wattles began blooming in the first week of August and are easily recognisable by their thick broad leaves. Like most wattles, they grow very fast and can reach a height of a couple of metres in two or three years.

Dark resin exuding from the trunk and branches can be eaten as a take-away snack and is good to chew, but beware; it can glue your teeth together if you bite off too much! Groves of wattle densely planted will exclude weeds after several years owing to the amount of leaf litter produced, which helps retain soil moisture and build healthy soils. Leaf-litter is good!

Common Bronzewing pigeons and other birds seek out the hard seeds which can lie dormant in the ground for years and wattles provide a nectar source for honeyeaters, bees and other insects, as well as habitat for woodland birds and lizards.

Golden Wattles grow about six to eight metres tall, in both clay and sandy soils. Their roots put nitrogen back in to the ground, contributing to healthy soil.

In 1992, the first day of September each year was officially declared 'National Wattle Day' throughout Australia by the Commonwealth of Australia. In addition, the whole of September is celebrated as National Biodiversity Month.

What are you going to do to celebrate?

The 300 year old 'Old Gum Tree' at Barossa Bushgardens, Nuriootpa

Home among the gum trees

The River Red Gum, *Eucalyptus camaldulensis*, is the grand old man of the bush, and arguably the most recognised and celebrated Australian tree. They live for many hundreds of years and grow to 25 or 30 metres tall. River Red Gums are found near water and typically on river banks and floodplains, and their presence in the distance often signifies the existence of a watercourse. They have evolved to survive and thrive in conditions which experience seasonal flooding.

River Red Gums had many traditional uses: slabs of bark were removed for making large canoes – only River Red Gum bark was said to resist the weather and not curl up or split. 'Canoe tree' scars are still to be seen in large old SA gums. Their branches and bark were used for shelters, called wurlies, which were made by placing three sticks in the ground in a triangle. Big sheets of bark were cut off and laid against the sticks to keep out the weather. Their leaves play host to sugar lerps which are eaten by Aboriginal people, providing a ready source of sugar. River Red Gum timber was prized for making tools and weapons such as boomerangs, waddies, digging sticks and coolamans.

River Red Gums are a five star resort for wildlife! Tree hollows in mature trees over 90 years old provide homes and beds for many bird species (eg parrots, galahs, nightjars, cockatiels, pardalotes) plus bees, possums and bats. High branches provide critical habitat for birds of prey, both as vantage points and for nesting (eg Nankeen Kestrel, Wedge-tail Eagle, Australian Falcon). Honeyeaters and pardalotes eagerly seek out the lerps for their sugary white 'roof 'and the tiny psyllid insect itself, which provides a rich protein source.

Flowers are in clusters of up to 12 and the gumnuts are tiny. Nectar in the gum blossom provides food for honeyeaters, insects, possums and insects. And last but not least, the River Red Gum's enormous overstorey umbrella, which can be a quarter of an acre in size, provides priceless shade for a whole ecosystem of understorey plants which could not survive in full sun. It is this shade which also reduces soil moisture loss in the ground below. Falling leaves are trapped by the understorey plants and add a further 'sunscreen effect' as leaf litter, which protects the ground as well as forming healthy soils.

How can we ever live without our beautiful River Red Gums?

Grey Mangroves at St Kilda (Inset: pneumatophores smothered by algae).

Marvellous mangroves

World Maritime Day falls on 26 September with the focus this year on reducing the impact of maritime transport; 'Sustainable development: International Maritime Organization's contribution beyond Rio+20'.

In Adelaide, the main hub of maritime transport is around the Port River and Barker Inlet. This is also where the most extensive and southernmost forests of Grey Mangroves, *Avicennia marina*, can be found in South Australia covering 17.7km^2. South Australia has the largest area of Grey Mangrove temperate forests in Australia, but they are confined to the sheltered shores of Gulf St Vincent, Spencer Gulf and protected bays on Eyre Peninsula; a total area of approximately 156 km^2. Mangroves are woody plants or plant communities that inhabit the intertidal zone (the area between the land and sea). They have special adaptations enabling them to survive in areas that are flooded and drained by tides. Cable and anchor roots support mangrove trees, protecting them from wave action, and small roots collect nutrients needed for plant growth from the mud. As oxygen is very limited in the mud, mangroves have had to adapt by raising part of their roots above the surface. These pneumatophores act much like a snorkel and are also waterproof, ensuring the plant doesn't become waterlogged during high tides.

Mangrove roots provide excellent shelter for many small animals, like mudskippers, snails, prawns and crabs, and the leafy canopy provides food and shelter to countless insects and birds. Mangroves also help by protecting the shoreline from erosion by stabilising mud and filtering and trapping pollutants before they enter coastal waters.

Since the 1950s, over 250ha of mangrove forest have been lost between St Kilda and Port Gawler, and many more are in poor health. Mangroves are under threat from high levels of nutrients entering the ocean from stormwater, sewage treatment plants and industry discharges. These high nutrient levels often trigger algal growth offshore, which can wash into mangrove forests and smother the mangrove seedlings and pneumatophores.

Other threats to mangroves include illegal dumping of solid wastes which smother and/or break pneumatophores, land clearing for coastal development and trampling of mangrove seedlings and pneumatophores by humans.

Drooping She-Oak

The ideal small tree for a natural playspace

The Drooping She-Oak, *Allocasuarina verticillata*, is the ideal small tree for a natural playspace in schools. They don't drop large branches, only grow to five to eight metres tall, provide good shade, and can be climbed after around eight years. They are attractive with their woody seed cones and segmented needles, and provide habitat for Yellow-tailed Black Cockatoos. What a drawcard for a school!

Children love their woody seed cones which can be used as loose parts in nature play, and their segmented needles, which can be twisted apart and re-joined, hence it is sometimes referred to as a 'lego tree'. She-Oaks produce a fine bed of soft leaf litter beneath their canopy and are restful places to sit and listen to the soughing of the wind through their branches.

Did you know there are male and female She-Oaks? Only the female tree has the attractive woody seed cones, which are a little larger than a 50c piece, oval in shape and brown in colour. On ripening in the sun the many pixels in each cone open up and from each one a winged seed parachutes to the ground. Seed can be germinated in early spring.

The Drooping She-Oak grows in a wide variety of soils and can be a solo voyager, seen gracing a distant rocky ridgeline, but its natural place in a woodland setting is as an understorey tree, nestled beneath a canopy of taller gums.

A creative use of this iconic South Aussie tree would be to loosely plant a grove of them 3m apart in a chessboard-style. This grove could be used as a natural playspace creating a secret forest, shady rest area, or meeting place.

Attractive creamy-coloured flowers appear from late summer to winter

Adelaide's Grey Box grassy woodlands

'Grey box' is the common name given to a species of Eucalypt, *Eucalyptus microcarpa*, which is endemic to Australia. It is found in the eastern states, as well as South Australia. These beautiful shade-providing trees typically grow to 25 metres, and have interesting, grey, fibrous bark on their trunks and lower branches. Attractive creamy-coloured flowers appear from late summer to winter.

The name microcarpa comes from Greek '*micros*' meaning small, and '*carpos*' meaning fruit, referring to the tree's small fruit.

In Adelaide, the Grey box species forms the dominant overstorey in a grassy-woodland (GBGW) community which stretches from Sellicks Beach in the south, to Burnside in the north, primarily along the hills face zone. The GBGW:

- is home to many wildflowers, lizards, birds, and invertebrates, many of which are also threatened
- covered an area of over 20,000ha of GBGW pre-clearance, with less than 2,000ha now remaining (much of which is heavily fragmented)
- is listed as a nationally threatened ecological community under Australia's national environment law, the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act).

Because this ecosystem extends into the urban area of a major Australian city, its conservation and restoration is dependent on Adelaide locals getting involved.

The ripe fruits of the quandong tree. (Photo: CSIRO)

Fancy a Quandong Tarte Tartin?

On 16 October 1945, 42 countries acted in Quebec, Canada, to create the Food and Agriculture Organization of the United Nations (FAO). FAO celebrates World Food Day each year on 16 October, taking steps forward against human hunger and malnutrition. This year celebrates the 35th World Food Day with the theme "Social Protection and Agriculture: breaking the cycle of rural poverty".

World Food Day provides an ideal learning opportunity for students to explore native bush foods which were traditionally relied upon as a source of nutrition. The famous Quandong, also known as 'Native Peach', was prized by Indigenous Australians not only for its tart flesh, which is highly nutritious and contains twice the vitamin C of an orange, but also the medicinal properties of its leaves and kernel.

The wood from the slow growing trees was prized for the making of traditional bowls – pitti or coolamons. The Quandong fruit feature heavily in aboriginal mythology across all the desert regions of Australia.

What recipes can your Health or Home Economics class think of to use with Quandongs? What could your Design and Technology class make from the wood of Quandongs?

References:

- Food and Agriculture Organisation of the United Nations 2015
- ABC News, 2015, 'Top 10 Australian native foods you need in your kitchen'
- Native Tastes of Australia, 'Quandong'

Nuriootpa High School's Blue Gum woodland, which is currently being rehabilitated as a Nature Space for the school, including a looped walking trail and natural amphitheatre, to encourage student engagement as a Learning Space

True blue and dinky-di!

The large and long-lived South Australian Blue Gum, *Eucalyptus leucoxylon*, is a majestic and graceful tree that is habitat heaven for a range of wildlife so it definitely makes Adelaide's tree "A list".

The Crested Shrike-tit particularly frequents Blue Gums to strip the decorticating bark in search of insects.

The Blue Gum's cream flowers are a nectar source for honeyeaters, lorikeets, insects and bees and hollows in large trees are important habitat and nesting niches for birds such as kookaburras and parrots, as well as possums, bees and other native animals. Fallen leaf litter and branches are ideal habitat for wildlife such as skinks and other lizards.

Blue Gums grow in both clay and sandy soils and reached a height of 20 metres. There are two subspecies in Adelaide and the Mount Lofty Ranges; the Adelaide Plains has subspecies leucoxylon, and subspecies pruinosa, the SA Inland Blue Gum, occurs in the Barossa and northwards.

Blue Gums have smooth bark and distinctive gumnuts which are the shape of a rounded wine glass, much larger than many other local gumnuts, and they usually have cream flowers but these are sometimes crimson.

The pine-like Native Cherry and its attractive red fruit

Native Christmas tree - the parasitic plant that takes and gives

Christmas is a time for giving. Despite the Native Cherry, *Exocarpos cupressiformis*, being semi-parasitic (it parasitises on the roots of its host plant, usually a Eucalypt), it is still a plant that gives in many different ways.

In the early days of European settlement their pine-like form led to them being used as an attractive native Christmas tree.

The small red fruit, that gives the plant its name, is an important food source for birds and other animals. When an animal eats the seed, the seed coat is softened by digestive juices and then deposited via faeces. This aids its spread through the bush. It is thought to germinate on the surface roots of Eucalypts in the humus layer.

Indigenous people in parts of Australia have used the plant in a variety of ways. The fruit can be eaten, the sap is thought to have been used to treat snakebites, the twigs as a tonic and astringent to stop infection in cuts and sores, and the leaves were smoked to repel insects in the warmer months.

The wood has been used in cabinet making and even to make golf clubs. Wood turners call it cherry pine.

So being a parasite does not mean that you also have to be a Scrooge. Happy Christmas from the parasitic plant that also gives.

References:

- Australian Plants online
- Eucryphia, the newsletter of the Australian Plants Society (Tasmania), December 2001

The Southern Cypress-pine produces its own adornments, but they're not red and shiny! (Photo: Jeremy Gramp)

Grow your own native Christmas tree

The Southern Cypress-pine, *Callitris gracilis*, is perfect with its single trunk and pyramid-shaped foliage. The tree grows 5 – 15 metres high and 2 - 4 metres wide and is long-lived and hardy.

It produces its own adornments; woody globe-shaped cones with six segments which, when they fall from the tree, can be collected and used in nature play or sorting and counting activities.

The Southern Cypress-pine was the only conifer found in the Adelaide Plains pre-European settlement and you can distinguish it from exotic species by the way the top of the tree weeps a little. Christmas is about giving and the Southern Cypress-pine fruits are enjoyed by many birds, especially cockatoos.

References:

- The native plants of Adelaide; returning the vanishing natural heritage of the Adelaide Plains to your garden by Phil Bagus and Lynda Tout-Smith.
- NRM Education Native plants of the Adelaide Plains ID chart

Key words: features of animals and plants.

The Native Apricot and its leathery fruit (Photos: Chris Hall)

A deceptive fruit

The Native Apricot, *Pittosporum angustifolium* (previously known as *P. phylliraeoides*) is a slow-growing tree with drooping branches and creamy to yellow flowers in summer. The flowers turn into a leathery heart-shaped orange fruit. The fruit's likeness to a tiny apricot is where it got its common name but sadly it is inedible. When the fruit dries, it splits open to reveal several bright red seeds. Birds such as Red Wattlebirds eat the seeds and as they pass through their gut a sticky coating that inhibits germination is removed, so the Red Wattlebird and Native Apricot have a mutually beneficial relationship.

The Native Apricot is used by many Aboriginal people (past and present) as a medicinal plant for bruises, colds, eczema and to induce lactation. Some people believe Native Apricots can even help fight cancer! Scientists at Griffith University studied the anti-bacterial and anti-fungal properties of the plant by doing several different types of tests with the leaves. They found when doing a test, using methanol and hexane extracts, that the plant inhibited the growth of 4 of the 14 bacteria tested. The methanol test was particularly potent again Proteus mirabilis which can cause pneumonia. The plant was also effective at inhibiting the fungus Aspergillus niger which can cause a black mould on certain fruits. The scientists concluded that their results partially validate the traditional Aboriginal usage of the Native Apricot to treat antibacterial and antifungal agents.

However the research is at a very early stage and more is needed to identify the individual compounds responsible.

Key words: Living things depend on each other; mutually beneficial relationship; science informs changes in human practices; Aboriginal and Torres Strait Islander knowledge.

References:

- What seed is that? By Neville Bonney
- Pharmacognosy communications - An Examination of the Medicinal Potential of Pittosporum phylliraeoides: Toxicity, Antibacterial and Antifungal Activities

Scientists believe that thick, fibrous bark in gum trees may be an adaptation to fire (Photo: Steve Walker)

This tree made a mess mate!

The Messmate Stringybark (*Eucalyptus obliqua*) is most easily recognised by its rough and cracked bark. Scientists believe the bark is an adaptation to fire, with the thick, fibrous material insulating the trunk from small to moderate fires. The inner bark is used to make string for bags and fishing nets, and tinder for starting fires; traditional uses for many Aboriginal groups. It is a common tree in the Mount Lofty Ranges because it needs high rainfall and well-drained soils to survive - not conditions you tend to find on the Adelaide plains! It is a tall tree in our region - typically growing up to 35 metres - but this is nothing compared to the giant specimens found in Tasmania. The tallest living Messmate Stringybark is 86 m tall, and another individual is so tall and wide that it contains 341 cubic metres of timber. That's equivalent to 68 elephants! This massive tree absorbs and holds the same amount of carbon dioxide that would be emitted by a car driving for 465 days non-stop.

Trees are amazing carbon sinks, which is relevant given that October 24 is the International Day for Climate Action. Early summer is generally not a good time of year to plant trees, but we can learn about them and the animals they support, look at reducing our paper use so fewer trees are harvested for pulp, and take care of the trees we currently have by planning an exclusion zone around them.

See NRM Education's land-based environments page for information and ideas.

Keywords and phrases: Living things live in different places; Features of animals and plants; Aboriginal and Torres Strait Islander knowledge; Adaptation

References:

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- www.understorey-network.org.au/search.html?species=Eucalyptus%20obliqua
- www.forestry.gov.uk/pdf/13_facts_and_figures.pdf/$FILE/13_facts_and_figures.pdf
- www.yousustain.com/footprint/howmuchco2?co2=306+tons

Pink Gum, like many Eucalypts, is named for the colour of its timber (Photo: Dinkum, Wiki Commons)

Tickled Pink Gum

The Pink Gum (E*ucalyptus fasciculosa*) is a small to medium-sized tree growing to a height of 10 to 15 metres. Before Europeans arrived in South Australia it was found in extensive woodlands across the southern Mount Lofty Ranges and the South East of our state, but is now listed as Near Threatened in many areas due to clearing for agriculture. Pink Gums can also suffer from Mistletoe infestation which, while important as a species for birds, can kill Pink Gums where fire regimes have been altered. Fire keeps Mistletoe in check.

Fortunately, pockets of Pink Gum remain in conservation parks through the Mt Lofty Ranges including Aldinga Scrub and Deep Creek and on a number of rural properties.

Pink Gum is particularly important for small woodland birds, which have also seen a significant decline since colonisation, as many of these birds feed on the nectar produced by the Pink Gum's creamy white flowers between May and January, as well as sap-sucking psyllids that feed on the leaves.

Psyllids produce a protective covering called a lerp, which looks like a raised white bump, and is actually a form of crystallised honeydew. Birds will eat the lerps and the psyllids below, thereby reducing pressure on the tree. Humans can also eat lerps, sometimes called manna, which is said to come from an Aboriginal language from the Mallee country of Victoria. Lerps contains 60% sugar and are often described as having the flavour of wedding cake icing.

Pink Gums prefer sandy or well-drained soil that is low in nutrients, and they also tolerate salt spray, so they are good choice for coastal sites.

Keywords: Producers, Consumers, Habitat loss, Predator and prey relationship, Living things live in different places, Effects of human activities, Features of animals and plants, Aboriginal and Torres Strait Islander knowledge.

References:

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- http://www.birdlife.org.au/australian-birdlife/detail/exuding-abundance

Feral Olives, living and treated, in the Sturt Gorge Recreation Park (Photo: Amy Blaylock)

Feral olives give me the pip!

A landscape can evoke strong emotions. A hillside dotted with Olives, their gnarled trunks rising from bulging lignotubers that support dense green foliage, reminds many of a Mediterranean landscape and perhaps happy holiday memories. The same scene in the Adelaide Hills can provoke similarly positive feelings for some, but for many visitors, landowners, bush carers and fire fighters alike, the feelings are strongly negative.

Feral Olives are a physical representation of past and current values and policies; of unique adaptations of plants to climate; and of interactions between introduced plants and the introduced animals that eat their seeds and assist their dispersal. They can rapidly take over and out-compete the remnant grassy woodlands which are already alarmingly rare in our state.

As a result, the Olive (*Olea europaea*) is a declared plant across South Australia under the Natural Resources Management Act 2004 if not planted, used or maintained for a specific purpose. This means that landowners are required to control feral Olives on their property.

How do you find out which native species have been replaced by Olives? If you are in the urban area you can download a list of the plants that grew in your suburb before European colonisation and source them from local nurseries and community groups or attend workshops and learn how to propagate them.

You can also volunteer with a local community group and control weeds like Olives, allowing natural regeneration to occur. Why not learn about the ecological systems that are integral to the cultural landscapes of the Kaurna people?

References:

- feral olive fact sheet
- Weed Info: How to Control Wild Olive
- Kaurna Meyunna Cultural Mapping
- Kaurna yarta ana Cultural Map

Peppermint Box at Hutton Vale Farm, Angaston (Photo: Chris Hall)

Peppermint Box, by gum!

Trees are often what we first notice about a landscape, and the iconic, medium-sized Peppermint Box certainly captures the local spirit of place.

The Ngadjuri people of the lower and mid-North identify with this tree and were called "the Peppermint Gum people" by neighbouring tribes. Not surprisingly, the geographic range of this eucalypt falls within part of the Ngadjuri's traditional area.

Peppermint Box grows from the mid-north to the South Coast and from the River Murray (and further) in the east through to the coast on the Adelaide Plains and Fleurieu Peninsula in the west.

Peppermint Gums have a spreading habit, and may be multi-stemmed, with small white flower clusters from autumn to spring. They are easily distinguished by their rough brown to grey bark on the trunk.

Their branches and hollows are critical habitat for woodland birds such as robins, Owlet-nightjars, Grey Shrike-thrushes, honeyeaters and other species.

Like other gums, they generate huge quantities of leaf litter, providing ground layer habitat for echidnas, skinks and many invertebrates.

To learn more about our region's local plants and wildlife, see the plants and animals page on our website.

Ecosystem processes

Royal spoonbills take flight at Barker Inlet Wetlands (Photo: Steve Walker)

Groundwater - hidden yet so very precious

March 10-16 2013 is National Groundwater Awareness week. It is a time where we can learn about a hidden yet very important natural resource – Groundwater. The importance of groundwater is often underestimated as many people don't understand what it is or why it is so valuable.

Groundwater is water that is located below the earth's surface. Over time, water from rain and rivers moves through the ground and is stored in certain types of soils and rocks. This storage area is known as an aquifer.

In many places, groundwater makes its way naturally to the surface, creating natural springs, which may feed into rivers and wetlands providing much needed fresh water for many plants and animals, including spoonbills and ibises.

In Australia, we use groundwater for agriculture, drinking and irrigation, which can be extracted through a variety of bores and wells. Groundwater provides about 17% of Australia's accessible water resources, and up to 30% in some parts of the country. Given we are the driest inhabited continent, it is really important we understand and sustain this hidden resource.

Although groundwater accounts for 98% of the fresh water on the planet, it can't always be used. When it can be used it must be done so sustainably or the ecosystems and communities that it supports will suffer significantly. It is also important when using any type of water, whether from a river like the Murray or from groundwater, that we always ensure we have good habits so we can conserve every last drop.

These beetles are always busy recycling.

Natural recycling

Natural environments use a natural cycle to recycle in many different ways. For example, a Stringybark forest with different layers of plants recycles the many things that drop to the ground, such as leaves, bark, dead animals, flowers, and branches. When they land on the ground the recycling process begins with hundreds of different creatures playing their part.

Some busy insects that are always recycling include ants, termites and beetles. Other recyclers include worms, bacteria and fungi. Slowly all the dropped material is turned into nutrients that help feed the trees, shrubs, and animals – the perfect way to recycle.

How good is your recycling system? Next week is National Recycling Week, the perfect week to start thinking about your recycling and an ideal opportunity to do some learning around waste.

There are also some great resources and professional development opportunities available through Wipe out Waste.

Common Greenshank (photo: Bill O'Malley)

Farewell shorebirds

Did you know that our smallest migratory shorebird, the Red-necked Stint, is about the same size as a sparrow and weighs only as much as two 50c coins, yet manages to fly 10,000 km to its breeding grounds in Siberia; and then back again to Gulf St Vincent and other parts of Australia to recover and feed over our summer?

Or that migratory shorebirds come to Australia specifically to feed and recover from their breeding in the northern hemisphere?

Great Knots eat so much they almost double their body weight and look like "footballs with legs" before departing on their amazing migration to breed in Siberia.

BirdLife Australia is running a promotion to farewell our migratory shorebirds and follow them on their journeys along the East Asia Australasia migratory flyway.

Sign on to Farewell Shorebirds for weekly email updates on where the birds are and what they are doing.

The long-lasting seed florets of Vittadinia

Go forth and multiply!

Is necessity the mother of invention? Nature spreads her seeds in a number of ingenious ways: via wind or water for a start. For example, look at the tiny seeds of our very own native daisy (*Vittadinia* species) in the photo. Each flower ripens into a feathery ball, a cluster containing numerous parachutes all kitted out to disperse their precious cargo on the wind, hoping for a serendipitous niche to land in and take hold. Similarly, water can be the dispersal medium: the tiny pinhead seeds of reeds and sedges, as well as River Red Gums, that populate the water's edge, are passively borne upon the current for long distances down our creeks and rivers, to wash up wherever. Then there are other agents from the animal world which are incidental spreaders of seed, such as birds, kangaroos, emus, echidnas and foxes. The seed is either attached to their paws or fur, or digested and spread via their scats. Witness an emu scat for example, a veritable seed omelette au naturel! Spear Grass (*Austrostipa* species) and Kangaroo Grass (*Themeda triandra*) seeds are obvious examples of seeds that will attach themselves only too eagerly to our own clothing or socks, hitching a free ride! Ecosystems are intricate webs in which everything is connected, in sometimes marvellous and ingenious ways; often the seed depends on the disperser, as well as vice versa! The Mistletoe Bird, having eaten the fruit of the Mistletoe (a native parasite which takes root on the branch of a shrub or tree), flies off to later excrete the seed by straddling another branch where the sticky seed may attach itself and germinate, symbiotically reproducing the species. Why not give nature a helping hand by having students sow the seeds for a permanent native herbfield in your school, pre-school or home garden? You can create a beautiful herbfield thriving with a mix of local Adelaide grasses, daisies, reeds and tiny saltbushes (*Einadia* and *Atriplex* species) by simply spreading rounded river pebbles out in a sunny spot, one to two layers deep, and hand-sowing the seed in May/June. This pebble method of propagation works for several reasons: the seed loves the tiny moist niches created by the pebbles, resulting in a high germination rate; and by spreading the native seed over the bare pebbles you have a year's head start on weeds, enabling the herbfield to establish. Once established it tends to self-colonise, and eventually becomes self-sustaining as a 'stable system' which effectively minimises intruders such as weeds.

For other great local native plants look at the Adelaide gardens – a planting guide or Coastal gardens – a planting guide and other resources on our website.

Plankton includes a wide range of animal-like and plant-like organisms, as well as juvenile fish, crustaceans and molluscs. (Photo sourced from http://blueplanetsociety.blogspot.com.au)

Peering into the world of Plankton

Plankton is the name given to a collection of tiny life forms that float in the currents within marine and aquatic environments. Plankton are generally classified as organisms that are too small or weak to swim against the current.

Algae, bacteria, protozoans, molluscs and crustaceans are all organisms that can be classified as plankton. To better define plankton, individual species are often classified as either Zooplankton or Phytoplankton. Zooplankton are organisms that are considered more animal-like, gaining energy through consuming other organisms, whereas phytoplankton are considered to be more plant-like, converting sunlight into energy.

Just as plants do on land, phytoplankton play a hugely important role as the primary producers of the ocean. They convert energy through photosynthesis and, as such, are a significant source of nutrients for larger organisms, such as zooplankton, fish and whales.

Phytoplankton are the most important organisms for the transfer of carbon dioxide between the atmosphere and the oceans but their reproduction and growth are limited by a range of factors including sea temperature; pH; salinity; water depth; predators; and the availability of nutrients critical for phytoplankton growth. Phytoplankton populations can boom when conditions are ideal, creating blooms within the ocean that can cover hundreds of square kilometres. These booms are often short-lived. On some occasions the dead phytoplankton sinking to the floor of the ocean, lake or river are decomposed by bacteria. As the bacteria decompose the phytoplankton, oxygen in the water is depleted causing a dead zone where no animal life can exist.

Some phytoplankton also contain bio toxins which cause large-scale marine mortality as larger animals consume the bio toxins and die.

References:

- Earth Observatory
- University of Tasmania

Eucalyptus gall in Deep Creek Conservation Park (Photo: Dani Austin)

You've got some gall

Those warty structures that sometimes appear on the leaves and stems of plants have an interesting cause, and the collective name given to these abnormal growths is galls. They are examples of insect, fungal or bacterial parasitism, and give a fascinating insight into the complex relationships organisms have developed over millions of years of co-evolution.

In the case of insect galls, herbivorous insects like midges or wasps inject a chemical that tricks the plant into creating a structure that forms both the habitat and the food source for their larvae. This usually occurs during times that the plant is growing rapidly, which for our local natives is spring and autumn. Interestingly, the shape and location of a gall is often quite specific to the parasite that has attacked the plant, so it is often possible to identify the parasite without ever seeing the adult insect or larvae.

People have made use of galls for millennia, and they have come up with some surprising applications. For example, galls often contain high levels of tannins which makes them useful for tanning skins or dying fabric, as is the case with iron gall ink from European Oak galls. In Central Australia, the Arrernte people roast the galls of a Mulga tree (*Acacia aneura*), which have a sweet apple taste and contain the added boost of protein from the developing insect larvae.

Galls are conspicuous and therefore easy to find once you know what you're looking for. Why not organise a walk around your school or local area to see how many different types you can locate?

Key words and phrases: Plants provide shelter; Adaptation; Seasons; Lifecycles; Predator and prey relationship; Living things depend on each other; Features of animals and plants; Aboriginal and Torres Strait Islander knowledge

References:

- https://entomologytoday.org/2015/06/11/galls-insects-behind-the-weird-growths-on-plants/
- http://www.bio.brandeis.edu/fieldbio/galls/galls.html

Native flat oyster reef, Georges Bay, Tasmania (Photo: Dr Chris Gillies, The Nature Conservancy)

Our most endangered ocean ecosystem

It's not what you might think…

World Environment Day (5 June) and World Oceans Day (8 June) provide a wonderful opportunity to explore the world around us. For example, did you know Australia's most endangered ocean ecosystem is not the Great Barrier Reef? A new study published in the scientific journal PLOS ONE earlier this year confirmed that up to 99% of Australia's shellfish reefs have disappeared. The reefs are formed by oysters and mussels which also modify and maintain the complex living structures. They play a key role in the ecosystem by providing food, shelter, protection, reduce coastal erosion and improve water quality, similar to coral reefs. Shellfish reefs occur near shore and in enclosed coastal waters in every Australian state.

The main reasons for the decline in the reef producers, and the reefs themselves are; overfishing, destructive fishing practices, disease, habitat destruction, and poor water quality. There is good news though; most of the declines occurred during the 1800s and early 1900s and, with help and protection (from human use), these reefs are able to make a comeback.

Estuary Care Foundation SA is one such group leading the charge. With support from a Community NRM Action Grant they are undertaking the Port River Shellfish Restoration Project, which aims to bring oysters, mussels and razor fish back into the waters of the Port River and Barket Inlet.

References:

- http://www.natureaustralia.org.au/2018/02/new-study-reveals-australias-most-endangered-ocean-ecosystem-and-its-not-what-you-think/
- https://soe.environment.gov.au/theme/coasts/topic/2016/recovery-change
- https://www.jcu.edu.au/news/releases/2018/february/new-study-reveals-australias-most-endangered-ocean-ecosystem-and-its-not-what-you-think

Youth leaders undertaking water monitoring in the Onkaparinga River at Verdun (Photo: Jeremy Gramp)

Where would we be without water?

With World Water Monitoring Day and World Rivers Day falling on 18 and 20 September respectively, it's a good time to stop and appreciate the precious water courses we have in our region and their high importance for biodiversity.

One of the most significant of these is the Onkaparinga River. This is the largest permanent river existing entirely in South Australia; beginning near Charleston in the Mount Lofty Ranges and flowing to the river mouth at Port Noarlunga. Along the 88 kilometres that the river flows there are many significant habitats. The river is home to diverse fauna, including many important native fish, frog and bird species. The numerous wetlands in the Onkaparinga catchment are biodiversity hotspots that also play an important role in water purification. Aquatic plants in these wetlands play an important role, functioning as nutrient filters.

The estuary at the end of the river extends for 10 kilometres and provides critical habitat for water birds, with up to 120 species having been sighted in the area. The estuary isn't just important for local species; it is also a critical feeding zone for the migratory birds journeying to and from the Arctic to Southern Australia and New Zealand every year.

Despite the biodiversity importance of the Onkaparinga River and similar areas, many issues including altered and reduced water flows, storm water pollution and the loss of riparian vegetation are placing these habitats at risk,. To ensure that the river and its adjoining wetlands continue to support native flora and fauna, we can learn, investigate and take action to improve and restore this precious resource.

References:

- http://birdlife.org.au/documents/Shorebirds-FactSheet.pdf
- The best of catchment connections
- https://www.naturalresources.sa.gov.au/adelaidemtloftyranges/education/for-educators/plants-and-animals/freshwater-environments

Tree hollows provide habitat for birds, mammals and other animals (Photo: Rob Wallace)

Habitat for animals

It has been estimated that around 300 Australian vertebrate animal species use hollows in trees. This includes small parrots, cockatoos, owls, possums, bats, frogs and lizards. Seventeen percent of our bird species, 42 % of mammals and 28% of reptiles use hollows. Research undertaken in south-eastern Australian eucalypt forests found that fauna occupied 57% of all hollow-bearing trees.

Hollows in trees provide shelter from weather and predators, and places for roosting, breeding and rearing young. They are formed by natural forces such as fire, termites and wood rotting fungi breaking down the tree's heartwood. Estimates vary but small hollows for small mammals, lizards and smaller birds (2-5 cm) take around 100 years to form and larger hollows (greater than 10 cm) for possums, parrots and other larger birds, around 200 years.

There has been a steady decline in the amount of hollows in native vegetation due to the human impacts of clearing, wildfires killing trees, lack of recruitment of new trees, health decline and early death due to environmental stresses, degraded habitat, and competition from introduced species including bees and starlings.

So what can you do to help hollow dependent wildlife species? As it takes 200 years to make hollows the most important thing you can do is to protect intact areas of remnant native vegetation that contain hollows (it's also important to protect areas that don't have hollows as well, as remnant vegetation provides habitat for many animal species). We must retain living and dead trees with hollows even if they aren't in areas of intact vegetation. Fallen dead trees and logs with hollows are also useful. Keep or bring in trees or logs that have fallen to provide hollows for ground dwelling species. Plant the local native species that produce hollows. Don't plant them too close, as this inhibits hollow production. You may not see the benefits, but you may help animals in the future.

You can also build and install nest boxes around your site. Use a variety of types and sizes to cater for a range of animals.

For more information on taking action in relation to tree hollows and nest boxes go to: our Engaging with Nature: Nest Boxes and Hollow Habitat Assessment Teacher Information Pack.

An Echidna puggle in its underground tunnel loves the blanket of dead leaves and twigs which keep it warm (Photo: Drs Mike McKelvey and Peggy Rismiller)

There's leaf litter, and there's leaflife

We all know about leaf litter; the collective term for dead leaves, fallen bark, twigs, seeds and so on. We know about problems in autumn when deciduous exotic trees such as Plane Trees, Ash and Willows suddenly drop their leaves, causing leaf overload issues down at ground level. Not to mention the acidification of creeks and rivers owing to the massive overdose of leaves breaking down over a short period. This is different from native plants (eg gum trees) whose leaves are generally thicker and drop over a much longer period, taking longer to break down and placing less stress on the body of water they fall into.

So not all dead leaves are created equal…

Leaf litter in a natural system (eg woodland comprising only native plants) is actually a good thing, as it supports so much other life. Dead and decaying plant matter has at least three major benefits:

It is **Nature's sunscreen**, protecting bare ground, thereby reducing soil moisture loss; very important for our plants with a warming climate. Less soil moisture loss means less stressed plants.

It is also **habitat** for all sorts of bugs, skinks, beetles, worms, spiders, moths and detritus feeders. Echidnas forage in dead leaves and, if disturbed, they readily bunker down against a tree trunk or dig in, instantly camouflaged. Giant Earthworms in Barossa woodlands which grow to half a metre are only found in undisturbed woodland under trees. Bibron's Toadlets lay their eggs in depressions on the ground within damp leaves.

It is '**soil in the act of becoming**'! It improves soil quality as organic matter breaks down into new soil.

So why would you want to throw any dead leaves into your bin? It's not litter; it's a precious natural resource. We know about wildlife and birdlife, so we might call it leaflife, not leaf litter. Can you or your students think of a better word to describe this valuable resource?

Spread it on your garden to minimise winter weeds and mulch around plants, therefore replacing the need for herbicides (but don't remove it from natural areas). Leaves can also be added to compost to build up organic matter. Learn to love your leaflife.

Oxalis perennans (Photo: Amy Blaylock)

Native sorrel + ants = copper

The inconspicuous groundcover that keeps popping up between your pavers might just be one half of the winning formula for bringing back one of our rarest Adelaide butterflies, the Chequered Copper (*Lucia limbaria*). These butterflies lay their eggs on Native Sorrel (*Oxalis perennans*), which is common to woodlands, mallee and grasslands across South Australia. Attendant ants take the newly hatched caterpillars into their nest and guide them out to the plants during the day to feed. By producing pheromones like those of the ants, the caterpillars avoid becoming prey. This is just one of the amazing relationships our native butterflies have.

So why don't we have more Chequered Coppers around Adelaide? Like many of our native butterfly species, the caterpillars and adults have very specific food plants, and more than 90% of Adelaide's original vegetation has been cleared since colonisation. This makes your garden a critical part of the conservation effort. So next time you go to spray or pull out the 'weeds' in your path, please check to see what they are first and consider keeping Native Sorrel.

Use our Native Plants of the Adelaide Plains chart to pick plant species for your garden that will create much needed food sources for all of our butterflies and also our Butterflies of the Adelaide Region chart to work out which butterflies you have in your garden or local park.

Keywords and phrases: Lifecycles, food webs, Effects of human activities, Habitat loss, Mutually beneficial relationship

References:

- http://www.flora.sa.gov.au/cgi-bin/speciesfacts_display.cgi?form=speciesfacts&name=Oxalis_perennans
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