NATURA Far South Coast

Observing and understanding the flora and fauna of Bermagui/Wallaga Lake's forests and shorelines

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Greetings all. Although July has been a month of cold nights, crisp mornings and the occasional frost many of the days have been mild enough to offer a hint at spring. As much as I've been enjoying these pleasantly warm daytime temperature when I am out and about, I am also becoming increasingly concerned by the persistence of above-average temperatures and the lack of rainfall over the past two months. The BoM has yet to declare an El Niño event but did upgrade the chance of it from 'watch' to 'alert' early last month and I fear that, in light of our own currently trending mild, dry winter and the above-average atmospheric and sea surface temperatures being reported from the northern hemisphere, it is only a matter of time before we find ourselves feeling the full effects of an El Niño season. Also worrying is the Indian Ocean Dipole (IOD) which looks ready to enter a "positive" phase. A BoM update issued in early July stated "A positive IOD supresses winter and spring rainfall over much of Australia and, if it coincides with El Niño, can exacerbate El Niño's drying effect." Despite these indicators I hope I am very much mistaken in my prediction of a long, dry and potentially very hot spring and summer. In the meantime, let's all keep our fingers crossed for some decent rainfall soon as it's hardly worth mentioning the just over 1mm that landed in my rain gauge this month.

MANGROVE and SALTMARSH ECOSYSTEMS

Early in the month I was invited to join a friend for a walk through the mangrove and saltmarsh habitat at the end of Bermagui's River Rd. The grey skies and on again – off again mizzle may not have been particularly conducive to lingering … or good photography … but did little to dampen our spirits as we filled an afternoon with a leisurely amble. Rather ashamedly, I have to admit that I was not at all familiar with these habitats and knew next-to-nothing about the plants that grew there, so was very grateful to be in the company of someone much more knowledgeable than myself and I learnt much. Thanks Barry for inviting me to join you, and for sharing your wisdom.

Before revisiting the River Rd site I thought it judicious to do a bit of research on the ecology of mangroves and saltmarshes so that I could better understand the area I was walking through, and the species that it supported. It was very much a "back to basics" exercise that resulted in several pages of scribbled notes which I have summarised and put into some sort of order here. Shown at left is a portion of the mangrove and saltmarsh habitat that Barry and I walked together. The photo was taken on a second visit to the location later in July when the weather was far more favourable for photography.

WHAT ARE MANGROVES and SALTMARSHES?

Mangroves and saltmarshes are intertidal communities of plants that grow on the foreshores of coastal lakes, tidal estuaries and other marine shorelines. Because they link land and sea, saltmarsh and mangrove ecosystems provide productive habitats for a range of species including crabs, molluscs and migratory shorebirds, and support commercial and recreational fisheries. As seen at the River Rd site, these two distinct ecosystems are often adjacent to each other with each occupying a different tidal zone of the same shoreline. Despite their proximity, saltmarsh and mangrove ecosystems are dominated by very different plant species that all share one thing in common – an ability to survive in saline conditions which most other vegetation cannot tolerate. Although saltmarshes are typically situated landward of mangroves they are not dependant on them for survival and can exist where no, or very few, mangroves grow. Evidence of this can be seen on the southern side of the Bermagui River where a saltmarsh community is thriving in an area above most regular high tide marks and largely without mangroves along the foreshore. In combination with seagrass meadows, mangroves and saltmarshes form an ecosystem that is collectively known as Coastal Wetlands.

The photo above shows pneumatophores of Grey Mangrove (*Avicennia marina*) growing at the River Rd, Bermagui site. As you can see, these aerial roots are visible well away from the plants they are supplying oxygen to and, because they are growing up from the underground roots, are a good indication of just how extensive the plants' unseen root systems are.

MANGROVE SPECIES of the NSW FAR SOUTH COAST

Before the River Rd walk I had naively presumed that "a mangrove is a mangrove" and that only one species was found in our local area. Barry was quick to correct my misconception and was able to not only point out the two species – Grey Mangrove and River Mangrove - which grow here on the far south coast, but also explain their differences. Although there are at least five mangrove species in NSW these are the only two found this far south and are, in fact, the only two species which can grow at such low (or high) latitudes anywhere in the world. Grey and River Mangroves are quite distinct in both appearance and ecology, with the Grey Mangrove being, by far, the most dominant species in the local area. Although Grey Mangroves and River Mangroves share many of the features that define a mangrove, including a tolerance of saline conditions, a complex salt filtration system and a root system adapted to cope with the low-oxygen conditions of waterlogged substrates, the two species are not related and belong to different plant families - the Grey Mangrove is in the Acanthus family while the River Mangrove is in the Primrose family.

Grey Mangrove (*Avicennia marina*) - With its distinctive, peg-like aerial roots poking through the mud, the Grey Mangrove is the quintessential and most familiar mangrove species for many of us. Because it can grow in a range of soils and climates, the Grey Mangrove is the most common and widespread mangrove

species found within intertidal zones, both in Australia and throughout the world. Growing to a height of 3 to 10 metres and with a spreading leafy crown, Grey Mangroves like to grow in soft muds and sandy soils and are highly tolerant of saline waters and soils. However, they thrive best in estuaries with brackish (part salt, part fresh) water.

The leaves of Grey Mangrove are oval-shaped with a pointed tip and are glossy green above with a pale and slightly hairy grey underside. Both sides of the leaf surface have ***stomata*** (pores) and salt glands that allow the plant to excrete excess salt. These stomata and salt glands are more abundant on the leaf's underside. The leaves, which measure up to 8 cm long and 5 cm wide, are arranged opposite one and other along the stems. The main flush of flowers occurs once year, typically in mid to late summer but with timing greatly influenced by location. Here on the far south coast most flowering occurs around May and June while, in far northern Australia, flowering generally occurs in November and December. Regardless of location, minor flowering can occur year round. The flowers are small (4 - 8 mm long and 3 - 7 mm wide) with 4 white to golden yellow petals. The flowers occur in fragrant clusters of three to five and are pollinated by insects, primarily bees. After pollination, the flowers form flat, pale green and hairy fruits that are 3 cm long and 2 cm wide. Each fruit contains a single seed. In a process known as ***vivipary***, the seed germinates inside the thin, hairy seed coat while still attached to the tree. The enclosed seedling has two fleshy and closely folded ***cotyledons*** (the leaf or leaves of a plant embryo which develop into the first set of leaves) and ***plumule*** (an embryonic shoot which develops into the future stem and leaves of the plant) with hairy young roots between. These partially germinated seed cases are known as ***propagules*** and allow the young mangrove seedlings to quickly establish themselves after they have fallen from the tree and settled in suitable substrate. Grey Mangrove propagules are produced in large numbers and can stay on the tree for up to 12 months, especially in cooler southern locations. When mature, they fall from the tree and float freely in water until the seed coat drops away, allowing the seedling to sink, settle and establish itself. The speed with which this happens depends on the temperature and salinity of the water. In water of high or low salinity the seed coat is slow to drop off, but in brackish water it is shed quickly. Higher temperatures also favour faster action. Although the obligate dispersal period for Grey Mangrove propagules is one week they can remain viable for up to 5 months when either exposed by tides or totally submerged. The flotation period of the propagules allow them to vacate the area where their parents grow, thereby avoiding direct competition with already established mangroves. It also allows them, as a pioneer species, to be one of the first plants to grow and colonise newly emerged mud banks.

Above - Leaves of a Grey Mangrove (*Avicennia marina*). Note the difference in colour between the upper and lower leaf surfaces.

The most distinctive feature of Grey Mangroves is their peg-like aerial roots. These aerial roots, known as ***pneumatophores***, grow to a height of about 20 cm and are crucial for the tree's health and survival in the ***anaerobic*** (oxygen-poor) muds in which they grow because they cannot rely on underground roots alone to absorb oxygen as other most other plants do. Growing up from the underground roots, the pneumatophores emerge through the mud and act like snorkels to access oxygen directly from the atmosphere. In order to function, the pneumatophores are filled with spongy tissue and covered with raised, lens-shaped breathing

holes called ***lenticels*** which take in and transfer oxygen to the underground root system. This air intake occurs when the pneumatophores are submerged by water, causing the pressure within the spongy tissue to fall as the plant uses up the internally stored oxygen. The resulting negative pressure then allows more air to be drawn in through the lenticels when the roots are re-exposed as the tide level drops.

The underground root system of mangroves support and anchor the plants in the soft, waterlogged, and often unstable substrates, in which they grow. In order to keep the plants upright these underground root systems are extensive, and spread beyond the tree canopy to provide the mangroves with a broad, stable base even if adverse conditions erode the soft mud away. As a result, most mangroves have more living matter below the ground than above it. The main mass of roots generally lies within the top 2 metres of substrate, and consists of radiating cable roots punctuated by descending anchor roots to provide support. From this framework sprout many little nutritive roots that feed on the rich soil just below the surface and collect oxygen. Pneumatophores, if present, also grow from this framework. Because little oxygen is available in the fine and often waterlogged muds in which mangroves grow, the plants do not grow deep tap roots. Although mangroves are salt tolerant, mangroves have tiny pores on their roots that filter out salt as water enters the root system. Any excess salt that enters the plant is transferred to the leaves so that it can be extracted via salt glands. Both Grey and River Mangroves have this adaptive underground root system to help them survive in their salty, tidal and often unstable environment.

The photo at right shows young Grey Mangrove (*Avicennia marina*) seedlings growing amongst pneumatophores at the River Rd, Bermagui site. These seedlings may be some distance away from their parent plants.

A fun fact - The oldest known living mangrove in Australia, and probably the world, is a Grey Mangrove that has been carbon dated as being 738 years old (as at 2019). The tree is growing on a cattle station just north of Maryborough in south-east Queensland and has a girth of around three metres.

River Mangrove (*Aegiceras corniculatum*) - Although River Mangroves are less salt tolerant, and more fresh water tolerant, than Grey Mangroves the two species are often found growing together As the common name suggests, River Mangroves grow along tidal river banks and estuaries, especially in the upper reaches where water is more brackish. Although they can grow up to 7 metres tall, River Mangroves typically grow as a shrub or small tree up to 2 metres in height. The leaves of the River Mangrove are oval with a rounded tip, are glossy green above and pale green below and grow alternately along the stem. Each leaf is covered with minute salt glands that excrete salt from the plant. Over time, the excreted salt accumulates on the leaf surface, resulting in a fine film of white salt crystals. These salt crystal deposits are a primary characteristic by which River Mangroves can be identified. The tubular flowers are white with 5 petals, and grow in umbellate clusters of 10 to 30. The fragrant flowers smell like ripe bananas and attract a range of pollinators including bees, butterflies, moths, birds and small bats. Although most flowering occurs in late spring and early summer, minor flowering can occur throughout the year. The fleshy single-seeded fruit is curved and elongate with a

pointy tip, light green turning to pink as it ripens and is up to 75 mm in length. Fruiting is most abundant on the plant between summer and autumn. Like other mangroves, the River Mangrove is viviparous, with partial germination of the seed occurring within the seed case. Although the propagule does contain a root radicle and an embryonic shoot which will develop into the stem and leaves of the new plant, it does not develop cotyledons as the Grey Mangrove does. When mature, the propagule falls from the tree and either takes root in the sediments near the parent tree or floats on the tides and currents to other shorelines, eventually lodging in a suitable substrate where it can take root and begins to sprout. A small hook at the end of the propagule helps it to hold fast in the sediment until the first root radicle grows through the outer seed case. Unlike many other mangroves, the River Mangrove does not have aerial roots above the ground. Instead, the plant relies on low tide exposure of roots along the substrate for the intake of air. Both the roots and the base of the trunk have prominent lenticels which allow the plant to obtain oxygen from the atmosphere. The genus name "*Aegiceris*" is derived from the Greek "*aegi*" meaning "goat" and "*keras*" meaning "horn'. The species name "*corniculatum*" is derived from Latin and means "possessing horns". Both names are a reference to the shape of the plant's fruit.

The photo above shows the ripening propagules of River Mangrove (*Aegiceras corniculatum*). It is easy to see why the both the genus and species names reference horns. You may notice the small hooks at the end of the propagule which help secure it in the sediment until the first roots grow.

SALTMARSHES

Saltmarshes are areas of low, flat and poorly drained ground that are subject to occasional inundation by brackish or salt water. As the second and third zones of Coastal Saltmarsh habitat, they occupy the high tide zone, often behind mangroves (the first zone), on sheltered soft substrate foreshores of coastal lakes and estuaries. The area they occupy is above most regular high tides but can, on occasion, be inundated by medium to large and "king" tides. Saltmarshes act as natural filters, trapping and slowing down the movement of nutrients and sediments before they enter the water system, and support a mix of vegetation that can tolerate high soil salinity and occasional inundation with salt water. Although these plants are all, by necessity, hardy in order to survive in the variable saltmarsh environment, the habitat itself is fragile and easily damaged, and the Coastal Saltmarsh ecosystem of which they are a part classified as an endangered vegetation community.

At left - Saltmarsh vegetation at the end of Bermagui's River Rd. is dominated by broad stands of Sea Rush (*Juncus kraussii*) and low-growing succulents such as Samphire (*Sarcocornia quinqueflora*) and Austral Seablite (*Suaeda australis*).

Saltmarsh communities can be dominated by a single plant species or occur as a mosaic of mixed vegetation. The biodiversity of plant species is increased in areas that are less frequently inundated. Typically, saltmarsh habitat is a mix of rushes, sedges, grasses, succulent herbs and forbs (any non-woody flowering plant that is not a grass, sedge or rush). The second Coastal Marshland zone, which is more prone to inundation, is dominated by short succulents and groundcovers such as Austral Seablite (*Suaeda australis*), Native Sea Lavender (*Limonium australe*), Water Buttons (*Cotula coronopifolia*), Swamp Weed (*Selliera radicans*) and, that most iconic of saltmarsh plants, Beaded Glasswort (*Sarcocornia quinqueflora*). Also found in this zone is *Wilsonia backhousei*, a listed threatened species in NSW which can form an almost lawn-like dense ground cover. The third zone is at the "top" of the saltmarsh area and is only rarely flooded by salt water. Taller plants, grasses and forbs grow in this area, with Sea Rush (*Juncus kraussi*), Chaffy Saw-Sedge (*Gahnia filum*) and Coast Speargrass (*Austrostipa stipoides*) as typical species examples. Many of the succulent and forb species found in the second zone also grow here. Although saltmarshes occur throughout coastal Australia, the greatest floral species diversity is found in southern Australia. In total, approximately 250 species of saltmarsh and foreshore fringing plants have been recorded in NSW, but Jervis Bay is the northern-most extent for many of them. In the tropical areas of northern Australia saltmarsh habitat is comprised of than less than 10 plant species, so we are blessed here with such a rich biodiversity of vegetation in our saltmarsh habitats.

Above from left to right - **Native Sea Lavender (*Limonium australe*)** is a forb. Despite its common name this plant is not related to lavender - **Beaded Glasswort (*Sarcocornia quinqueflora*)**, also known as Samphire, is an iconic saltmarsh plant. It grows in dense colonies, usually on ground that experiences frequent tidal inundation - ***Wilsonia backhousei*** (no common name), is listed as a threatened species in NSW. As seen here on the southern side of the Bermagui River, it can form an almost lawn-like, dense ground cover.

FAUNA of our MANGROVE and SALTMARSH ECOSYSTEMS

As coastal wetlands, our local mangrove and saltmarsh ecosystems provide not only habitat but breeding and feeding grounds for a wide variety of fish, crustaceans, molluscs, insects and birds. About 75% of the fish, prawns and crabs caught for commercial and recreational purposes spend at least part of their lifecycles along the foreshores bounded by coastal wetland areas. These species include bream, flathead, mullet, whiting, garfish and luderick, many of which rely on mangroves as nurseries for their fry and fingerlings. Coastal wetlands support a range of birdlife, both on land and along their foreshores. Although some species, such as oystercatchers, cormorants, herons and terrestrial species such as honeyeaters and other passerines (perching birds), are present all year-round, many more species are migratory and only spend part of the year in our southern wetlands. These migratory birds include Red-capped Plovers, Double-banded Plovers, Blackfronted Dotterels, Bar-tailed Godwits and Eastern Curlews. Many of the migratory birds that rely on our coastal

wetlands as feeding, breeding and nesting sites have a conservation status ranging from vulnerable to critically endangered, and their annual presence highlights the importance and value of our local mangroves and saltmarsh habitats.

Many of the migratory birds that visit our coastal wetlands, including those shown below, are threatened species. **From left to right** – **Bar-tailed Godwit** (vulnerable) – **Double-banded Plover** (near-threated) – **Eastern Curlew** (critically endangered).



Mangroves as a habitat - Mangroves provide habitat and food for a diverse range of fauna. **Below, from left to right** – A pair of juvenile **Australian White Ibis** feeding amongst Grey Mangrove pneumatophores as the tide goes out – **A Semaphore Crab**. This was one of dozens, possibly 100 or more, that were feeding on sedimentary detritus as the tide was receding - a **Smooth Toadfish**. This is one of two Pufferfish species I observed at the River Rd site. The other, the Common Toadfish, is similar in body shape but paler in colour and without stripes. All of the pufferfish aka "toadies" I observed were adult and about 15 cm long. The photos below were taken at the River Rd, Bermagui site during July 2023.



Although all coastal wetland foreshores support a myriad of marine, semi-aquatic and terrestrial animals, the intertidal zone beneath mangrove trees is particularly rich in diversity. This is because the trees produce a large amount of organic matter. When litter such as leaves, flowers, seeds and bark drop from the trees it is quickly decomposed by bacteria and fungi. This decomposed matter, referred to as *detritus*, either lies on the surface of the mudflats surrounding the mangroves or is flushed into the water by outgoing tides or freshwater runoff, thereby creating the basis of the detritus food chain on which much of the mangrove fauna depends. Animals which feed on detritus are known as *detritivores* and, within the mangrove ecosystem, include fish, prawns, crabs, molluscs such as marine snails and slugs, and marine worms. Detritivores feed not

only on decomposing plant matter but also decaying animal matter and faeces. By feeding in this manner they play an important role as recyclers in the mangrove ecosystem and are especially crucial for recycling nutrients such as carbon, nitrogen, phosphorous, calcium and potassium back into the soil. These animals not only play an important role in the cycling of nutrients within the mangrove ecosystem but also become a food source for other animals such as fish and birds. Invertebrates such as insects, spiders, worms and gastropods (snails) also proliferate in the coastal wetland ecosystem. Although some, such as midges and mosquitoes, are considered "nuisance" species, many are beneficial, not only as an important opportunistic food source for birds, fish and other animals, but as pollinators. Bees, wasps, beetles, moths, butterflies and ants are just some of the insects that can be found within the coastal wetland habitat. Many of these play a role in pollination, albeit to a lesser or greater degree depending on species.

CRABS in our MANGROVE and SALTMARSH ECOSYSTEMS

Crabs are the most abundant and important larger invertebrate in mangrove forests. When building their burrows crabs improve the penetration of ground water, high tide water and freshwater runoff. This helps flush out excess salt thereby reducing soil salinity. The burrows also increase oxygen levels in the mud by creating air spaces, and allow deeper penetration of nutrients into the substrate. Crab holes also provide a habitat for many organisms including small fish, molluscs and worms. All of these things are immensely beneficial to the mangrove ecosystem with studies finding that the presence of crabs in mangrove forests not only improves the health and growth of mangrove plants, but also increase the biomass and diversity of other organisms. Both adult crabs and their aquatic larvae (***zoeae***) have been shown to be a significant food source for fish inhabiting the waters surrounding mangrove and saltmarsh habitats.

During two visits to the River Rd site in July I observed 3 crab species – the Semaphore Crab, the Light-blue Soldier Crab and an unidentified species. The Semaphore Crabs were by far the most numerous with hundreds observed across several separate mudflats. With such a large and obviously thriving crab population present the health and well-being of Bermagui River's mangroves seems assured, at least for the time being. **At right -** A Light-blue Soldier Crab on mangrove mudflat.

Semaphore Crabs (*Heloecius cordiformis*) , so named because the males wave their brightly coloured claws to communicate with other crabs, are the most abundant crab species found in Australian mangrove habitats. Adults are around 25 mm wide and have a dark purple, mottled carapace. The compound eyes are on long eyestalks. Male are larger and have larger and more conspicuously coloured claws than the females. The crabs live in burrows among the mangrove roots and emerge at low tide to feed on detritus in the sediment. Semaphore crabs are primarily a deposit feeder, sifting through the sediment for organic matter and detritus from mangroves, but also have large mandibles which they use to eat larger pieces of plant and animal matter. They can often be observed feeding on algae growing on the pneumatophores of Grey Mangrove. This feeding behaviour has enormous benefit for the Grey Mangrove plants as it helps keep the lenticels clear of algal build-up which could restrict oxygen intake. **A fun fact** - both male and female Semaphore Crabs use their claws alternately when feeding; while one claw is transferring food to the mouthparts, the other is gathering the next mouthful.

A BALSAM BEAST

Early in the month Joy Georgeson found this unusual katydid, ***Anthophiloptera dryas***, on a citrus tree at Beauty Point. This insect is known by the rather odd, and very cool-sounding, common name of "Balsam Beast" because of its large adult size (between 60 and 75 mm) and because it was first discovered on the flowers of a balsam plant. Balsam Beasts live in the forests, woodlands, heaths and urban areas along the east coast of Australia with a range extending from Cape York in Qld to Batemans Bay in NSW. Clearly, the one that Joy found is quite some way south of its acknowledged range and as such is a significant observation for the Bega Valley Shire. Congratulations Joy on such a fantastic discovery, and thank you for allowing me to share your photo of the beast here. It should be noted that the insect observed by Joy, and shown at left, is a very young nymph (juvenile) with a lot of growing to do before it can truly live up to its name!

Balsam Beasts can be remarkably variable in colour with various shades of green, light brown, tan and even yellow observed. The wings of mature insects are long and extend well beyond the abdomen but are absent (as in the very young nymph shown above) or greatly reduced in younger insects. Perhaps the most extraordinary feature of the Balsam Beast is the length of their antennae which are easily at least twice as long as the insect's body. Even by katydid standards this is extreme!

The preferred host plant of the Balsam Beast is Angophora (Apple Gum) trees where they feed nocturnally on the flowers but, when these flowers are scarce, they will often move to garden plants and fruit trees. Since trees in the Angophora genus usually flower between November and January, Balsam Beasts are often found in urban gardens during late winter or early spring when their preferred trees are devoid of blossoms. This fact is supported not only by Joy's finding of the insect on a citrus tree in July, but also by analysis of observations of the species on iNaturalist where 47 of the 71 observations were recorded between July and November with the majority of those observations made in urban gardens. Given its natural preference for Angophora trees, nocturnal feeding habits and cryptic colour I suspect that a Balsam Beast would be very difficult to spot "in the wild". The Balsam Beast plays an important role in the pollination of the plants on which it feeds because pollen attaches to hairs on the insect's body and is transported, and dislodged, as the insect moves between flowers.

BANKSIA BEES

Australia is home to an estimated 2,000 species of native bees and this month I was thrilled to reacquaint myself with one of them – Hylaeus alcyoneus, the Banksia Bee. I first observed this species in late August 2022 when I found them occupying a single Banksia integrifolia (Coastal Banksia) tree in the Bermagui Lagoon Nature Reserve and this month's observation was made on that same tree after I specifically returned to it in search of them. Curiously, and despite much time spent examining hundreds of banksias over the past 12

months, I have yet to find another tree "claimed" by this bee species as a home base. If anyone knows why the Banksia Bees might favour this one particular tree over all others please do let me know! Banksia Bees belong to the Colletidae family of bees. Over 50% of all Australian bee species belong to this family, and are collectively known as Plasterer Bees because they smooth the walls of their nest cells with secretions applied with their mouthparts. These secretions dry into a waterproof, cellophane-like lining, and are also used to seal the nest cells. Within the Colletidae family, Banksia Bees belong to the subfamily Hylaeinae. Hylaine bees are commonly known as "masked bees" because of the markings that are present on the faces of most species. The bees are relatively hairless, small and wasp-like in appearance and, in size, range from a tiny 3 mm long to a large 14 mm. Like all bees in the Hylaenae subfamily, Banksia Bees lack the external pollen-carrying hairs known as "scopa" which characterises most bees, and instead carry pollen in their crops (a thin-walled expanded portion of the alimentary tract used for the storage of food prior to digestion).

At right - A Banksia Bee resting on an old banksia cone. Note the metallic blue abdomen. This photo was taken in August 2022 at the Bermagui Lagoon Nature Reserve, and was the first time I had observed this species.

The Banksia Bee has a metallic blue abdomen and yellow face markings and, at 12 mm, is one of the biggest Hylaine bees. Like most of Australia's native bees, the Banksia Bee is a solitary bee. Females nest by themselves in pre-existing holes in wood, such as beetle holes in dead branches or tree trunks. Inside these cavities females construct a series of small brood cells, within each of which a single egg is laid. These brood cells are encapsulated in a waterproof, cellophane-like material which the female secretes from her mouth. To collect pollen and nectar to feed their young, female Banksia Bees mainly visit Banksia inflorescences (flower spikes). It is here that the females encounter the males. Individual male Banksia Bees establish territories around a banksia inflorescence, competing with other males for the best positions. Males will threaten each other, and occasionally physically wrestle to try to dominate the best territories. For this purpose the males, who are larger than the females, have an impressive pair of spines on the underside of their abdomen which are violently struck against their opponents using abdominal thrusts. Dominant males choose the most attractive inflorescences, with fresh, open flowers, and wait attentively to try to mate with any females who come in search of pollen and nectar. Unlike most bees, Banksia Bees – and all other Hylaeine bees - do not carry their collected pollen on the outside of their bodies. Instead, they swallow it for transfer back to nest. After braving the males and filling up on pollen and nectar, female Banksia Bees will often perch on stems, leaves or old banksia cones near the feeding site and repetitively regurgitate and swallow the sticky contents of their stomach. This process is known as "bubbling". They do this to concentrate and thicken the liquid meal before returning to the nest where they regurgitate the sweet and proteinaceous mix for the offspring to consume. This is rather like a seabird returning to her nest with a stomach full of fish to feed her chick. To watch a Banksia Bee bubbling is, in my opinion, one of life's truly remarkable and delightful experiences, and I highly recommend that you keep an eye out for them!

Above - Banksia Bee (*Hylaeus alcyoneus*) - The first photo shows a Banksia Bee resting inside an old Banksia cone. This "roosting" behaviour is one I have observed many times in this species - The next two photos show a female Banksia Bee "bubbling". In all photos note the insect's yellow face markings that are indicative of most bees in the Hylaeinae subfamily, and the reason why they are commonly referred to as "masked bees". As their common name suggests, Banksia Bees have a predilection for Banksia flowers as a food source, and as such are important pollinators of this native flora. One of the biggest threats faced by Banksia Bee populations is competition from the introduced European Honey Bee. In locations where the species coexist, the Banksia Bee has significantly fewer nests than at than at sites where no competition exists. This threat applies to many of our native bee species, and is the main reason why I disagree with the practise of placing commercial beehives, and especially Langstroth hives, in state forests.

*** A late edit** – When I returned to the River Rd site for a second time this month, curiosity got the better of me and I licked some mangrove leaves. My findings, in between gulps of water, were thus ….. yes, mangrove leaves are salty … the leaves of River Mangroves (Aegiceras corniculatum) are very salty (probably because they are less salt tolerant than the Grey Mangroves and therefore need to remove more salt in order to thrive (?) … the tops of river mangrove leaves are saltier than the undersides by quite some margin … grey mangrove leaves are only slightly salty with the undersides of the leaves marginally saltier than the upper surface … and lastly yes, you can clearly see the excreted salt crystals on the surface of River Mangrove leaves even with the naked eye.

And that, my friends, is a wrap. It may well be the "quiet time" of the year but there is still plenty going on in our reserves and forests, and along our shorelines, so make sure you get out there and enjoy it if you can. Until next month, be kind to each other and the environment,

Deb

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