The Wonders of Weed

An information sheet about beach wrack on the central-west coast of Western Australia.

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What is beach wrack?

Beach wrack, also known as sea wrack, refers to all natural material that washes up from the sea into the surf zone and onto our beaches. Whilst the majority of beach wrack is made up of seagrass and seaweed (to learn the difference between these, please see the Further Information section), it also contains a fascinating suite of ocean animals both living and dead. Beach wrack washes up onto beaches throughout the world, however the sheer abundance of wrack that occurs along our coastline has resulted in Western Australia becoming a world leader in beach wrack research!

Beach wrack is mostly a mixture of seagrass and seaweed, but on the central west coast of WA it's not uncommon for seagrass to dominate. The long strap-like Ribbonweed or Strapweed (*Posidonia spp*) and the thin-stemmed Wireweed (*Amphibolis spp*) are two common seagrass species that often contribute up to 80% of beach wrack. The remaining component of beach wrack will typically contain dozens of different species of seaweed which can be divided into three broad categories based on colour; red, brown and green seaweed. Two species of brown seaweed that are most common in our region are the large kelp (*Ecklonia radiata*) and the bubble-decorated *Sargassum* (*Sargassum spp*). Pictures of seagrasses and seaweeds, as well as other fascinating components of beach wrack, can be found in the Beachcombers Field Guide, referenced in the Further Information section.

Why does so much beach wrack wash up onto our central-west beaches?

Large volumes of beach wrack in our region are a direct result of ideal growing conditions for seagrass and seaweed provided by our near-shore environment. Large sandy lagoons provide the calmer waters that give seagrasses the opportunity to flourish. These lagoons are protected from powerful Indian Ocean swells by lines of parallel reefs aligning north-south just off our coastline, which are actually "fossilised" coastal sand dunes deposited thousands of years ago when the sea level was lower than it is today. In addition, these reefs serve to encourage the growth of seaweeds by providing the rocky surfaces that they need as attachment sites.

Our coastline not only has the perfect environment for growing seagrasses and seaweeds, it also has the low nutrient conditions that are required. Flowing from north to south along the WA coast is the Leeuwin Current which brings down warm, clear water that contains very little in the way of dissolved nutrients. Paradoxically it is this low nutrient water that helps to grow the bottom living seagrasses and seaweeds. Oceans that contain high nutrients tend to grow more microscopic algae which blocks out sunlight to any plants growing below. In contrast, low nutrient water along our coastline means less microscopic algae so the water stays very clear. As a result, lots of bright sunshine reaches the ocean floor allowing seagrasses and seaweeds to photosynthesise and grow.

With so much seagrass and seaweed growing close to our shore, it is no surprise that big swells associated with storms cause so much seagrass and seaweed to break off and wash up on our beaches. Most beach wrack is washed up during winter storms, but occasional summer storms also deposit wrack on our beaches. Beach wrack tends to accumulate in large banks at particular places along the coast, such as Sunset Beach in Geraldton. This is in response to local currents and swells, which in turn are affected by numerous factors such as the position and size of nearby reef systems, coastline shape and the presence of man-made structures such as groynes and marinas.

What can beach wrack tell us about the local marine environment?

It is surprising what can be learned about the nearby marine environment by looking closely at the wrack it produces. An abundance of seagrass, as is often the case along the central-west coast of WA, indicates vast seagrass beds growing in protected lagoons. Those lagoons must be protected from the Indian Ocean swells somehow, and the presence of seaweed which tends to only grow on rocky surfaces tells us that there must be offshore reefs out there as well. If there is a large amount of seagrass and a small amount of seaweed, this indicates that there are extensive seagrass beds and relatively small amounts of reef, and vice versa.

Seaweeds can also tell an interesting story. Brown algae such as kelp and *Sargassum* like to grow in turbulent conditions created by ocean swells, thus their presence indicates a moderate to high energy offshore environment. Offshore breakers can often be seen to confirm this. Red algae can grow with low lights level, and so are found in deeper water or habitats shaded by other algae, seagrass or rocky overhangs. Lots of red algae in wrack reflects these deep or shaded near-shore environments. Green algae likes to grow where there are lots of nutrients in the water, such as in estuaries. The fact that beach wrack on our coast typically contains very little green algae confirms that the offshore water contains low nutrients. Wrack near estuary mouths will often contain lots of green algae.

Aside from the plants, the presence of animals (or parts thereof) in wrack can also inform us about the local marine environment. The ever-present cuttlefish “bones” obviously indicate the presence of these marvellous cephalopods somewhere out there. But look closely at the bone and you might be able to surmise the presence of the culprit responsible for the cuttlefish’s demise. Often, impressions of evenly-spaced peg-like teeth can been found on the bone, indicating that this cuttlefish was dinner for a dolphin. Teeth marks from sharks, large fish and sea lions may also be found. Sponges are common in beach wrack, as are various shells, all of which can tell us a little more about the local marine environment. Please see the Beachcomber Field Guide for more information.

Why is beach wrack important for our coastal environment?

Beach wrack plays three very important roles in our coastal environment:

1. Recycling dissolved nutrients. As beach wrack breaks down, important nutrients such as carbon, nitrogen, potassium and numerous trace elements are released. These soak into the sand around the beach wrack and are carried back to the ocean by back-wash from waves and by groundwater flow beneath the surface. When floating in the water in the surf zone, nutrients are released directly into the ocean. These nutrients support the growth of nearby algae, seaweeds and seagrasses, which in turn become food for marine animals. This nutrient recycling is necessary for maintaining healthy and productive coastal ecosystems.

2. Production of food for fish and other animals. Beach wrack breaks down through the action of bacteria, fungi and other microbes, who tend to be messy feeders leaving behind lots of fragmented and dissolved organic matter. This matter, as well as the microbes themselves, becomes food for animals known as detritivores, (detritus = disintegrated organic matter, vore = eater of). These include amphipods (often known as sand hoppers), copepods, worms and fly larvae (ie maggots), and they are keenly sort after by birds, beetles and spiders on the beach and young fish in the water. Research has found that up to ten times more fish (of 30 different species) feed around wrack in the surf zone compared to sandy areas and that fish numbers increase as wrack quantities increase. Some of these fish are the juveniles of popular recreational species including cobbler, whiting and yellow-eyed mullet. In addition, the large numbers of juvenile fish feeding near wrack attract larger predators such as herring and tailor, so fishing is certainly improved near mature beach wrack.

3. Protecting beaches from erosion. Seaweeds are mostly soft and fleshy, which means they rot and break down very quickly, usually within days of being washed up. However, seagrasses are made of sterner stuff and parts of them can last up to five years on the beach. In particular, this applies to the thin stems of wireweed, which can often be seen sticking out of beach sand like large whiskers. When you see this, it is likely that beneath the sand and hidden from eye is a mass of these wiry stems in an interlocking mat. This mat acts like the reinforcing rods in concrete by providing a solid structure that holds the sand in place. This means that when large waves pound the beach, this reinforced sand washes away much more slowly than sand without reinforcing. In addition, large banks of beach wrack further reduce erosion by serving as an effective physical barrier to those same large waves, thereby reducing the amount of wave energy that can remove sand from the beach and into deeper water.

What are the threats to beach wrack?

1. Removal of "nuisance" beach wrack. Large banks of beach wrack can occupy much of a beach at certain times of the year, leaving little room for beach goers. Seagrass and seaweed washing around in the surf makes swimming unpleasant and gets caught on fishing line. Beach wrack that sits on the beach for some time will start to decompose and release hydrogen sulphide, otherwise known appropriately as rotten-egg gas. This is unpleasant for beach-goers and local residents, hence there is often strong public pressure for local authorities to "clean up" their local beach.

2. Removal of beach wrack for garden mulch. Keen gardeners know that putting beach wrack onto their gardens will result in a bumper crop of veggies. While this might seem like a harmless activity, if lots of people do it frequently then there is a substantial reduction of wrack reserves.

3. Removal of beach wrack for erosion control / stabilising sand dunes. Wherever there are large expanses of bare sand around coastal developments, there is a strong temptation to cover it with local beach wrack to stop it blowing away. Aside from the fact that this involves the removal of considerable quantities of wrack from the beach, this practise creates another problem, which is weed infestation. Unlike our native vegetation, weeds love lots of fertiliser, so covering an area with nutrient-rich beach wrack provides an ideal place for weeds to grow. One weed in particular, commonly called ice plant, loves the salty environment created by beach wrack and is often present where wrack mulch is used. Have a look for this weed next time you see wrack mulch, their fleshy leaves and stems are usually covered with "ice like" salt crystals. The high nutrients provided by wrack mulch can also serve to suppress regeneration of native species that can't tolerate high levels of nutrients in the soil.

4. Threats to live seagrass and seaweed. If there is no seagrass or seaweed living in our off-shore waters, then there will be no beach wrack washed up on our beaches. Living seagrasses and seaweeds need clear water that doesn't contain many nutrients. If water clarity decreases or if nutrient levels increase, then seagrasses and seaweeds will be suffer. Water clarity is decreased by suspended sediment, which can be stirred up by dredging, storms or washed from the land by rivers into the sea. Nutrient levels increase when industry and sewerage treatment facilities discharge nutrient-rich effluent directly into the sea. Nutrient-rich human waste also enters coastal waters via steady leaching from septic tanks into groundwater that then flows to the sea. Fertiliser run-off from agricultural lands washes down rivers and into the sea, greatly increasing nutrient levels in coastal waters. To a lesser extent, fertiliser run-off from coastal gardens and large expanses of lawn contribute to the problem. Seagrass beds are also destroyed by the physical action of dredging.

How can we look after our beach wrack?

1. Appreciate it for what it is. First and foremost we can acknowledge beach wrack for what it is; a vital part of our coastal environment. Without it, nutrients would not be recycled back into local waters

and our beaches would wash away more quickly. With lots of it around, we have more fish to catch and less erosion.

2. Do not use it on your garden. There is a strong temptation to head down to the beach after a storm and collect bags (or trailers!) full of beach wrack for your garden. If hundreds of people do this, then substantial amounts of nutrients are no longer available for recycling back into local waters and some protection against beach erosion is removed. Rather than helping yourself to this "free" mulch, consider the benefits of buying commercial mulches and organic fertilisers for your garden. Not only will your garden thrive, but you will be supporting local businesses whilst helping to conserve the local coastal environment.

3. Resist the urge to ask council to remove it. Yes, it does smell at times and it's not pleasant to swim in, but in most places it is only temporary, often lasting less than a week. Rest assured that it will soon wash away to a new location, get covered by sand or break down. In the meantime there are other, cleaner beaches to visit. There are a few places where beach wrack is present most of the year, but this has been happening for a very long time and should come as no surprise.

Further information

The difference between seagrass and seaweed.

http://myfwc.com/research/habitat/seagrasses/information/seagrass-vs-seaweed/

The Leeuwin Current – The life of the West

http://beachcombers-kit.fish.wa.gov.au/wp-content/uploads/2011/03/Leeuwin-Current-Life-of-the-West.pdf.

C'mon and Embrace the Smell (or how sea wrack plays a vital role in raising baby fish). Department of Fisheries, Western Fisheries Magazine, March 2009.

http://beachcombers-kit.fish.wa.gov.au/wp-content/uploads/2011/03/cmon-and-embrace-the-smell.pdf

Fisheries Fact Sheet – Seagrass, July 2011

http://www.fish.wa.gov.au/Documents/recreational_fishing/fact_sheets/fact_sheet_seagrasses.pdf

Flowers of the Ocean: WA's expansive seagrass meadows. Department of Fisheries, Western Fisheries Magazine, November 2006.

http://marinewaters.fish.wa.gov.au/wp-content/uploads/2011/03/WF-Nov2006-Page6-9.pdf

Beachcombers Field Guide, Department of Fisheries

http://www.fish.wa.gov.au/Documents/education/beachcombers-field-guide.pdf

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