



CARING
FOR
OUR
COUNTRY

Outdoor Activity - Lauderdale Saltmarsh Discovery Trail (all ages)

Overview: The Lauderdale saltmarsh Discovery Trail can be enjoyed by individuals, or led by a teacher/guide. It is an interpretive walk consisting of 9 discovery points starting and finishing at the car park of the old Lauderdale tip. The info pack can be read by individuals walking the trail to learn about the saltmarsh and tidal flat environment and the animals and plants that live there. Alternatively, it can be used as a resource for teachers/guides to lead the Discovery trail.

This info pack contains specially developed information relevant to each of the 9 Discovery Points that can be read out to students/participants to inform them about the interesting environment they are visiting. Several activities can also be undertaken as part of the walk to further engage students/participants. Currently there is no signage at the site, so it is essential you print out and take this info pack with you, including 9 discovery points and a map, so you can get the most out of the interpretive walk. Prior to the excursion teachers/guides should review the information provided for each of the 9 discovery points and select what is most relevant for their school age group. Follow the walking trail to discover the secrets of saltmarsh habitat and animals. This discovery experience is most beneficial when each student/participant has a 'Wildlife Detective' activity sheet to fill in as they walk, and can use magnifying glasses and binoculars. Inclusion of the 'Sensory Exploration' activity will engage students/participants further.

Additional stops are recommended to round off the saltmarsh experience, at the nearby:

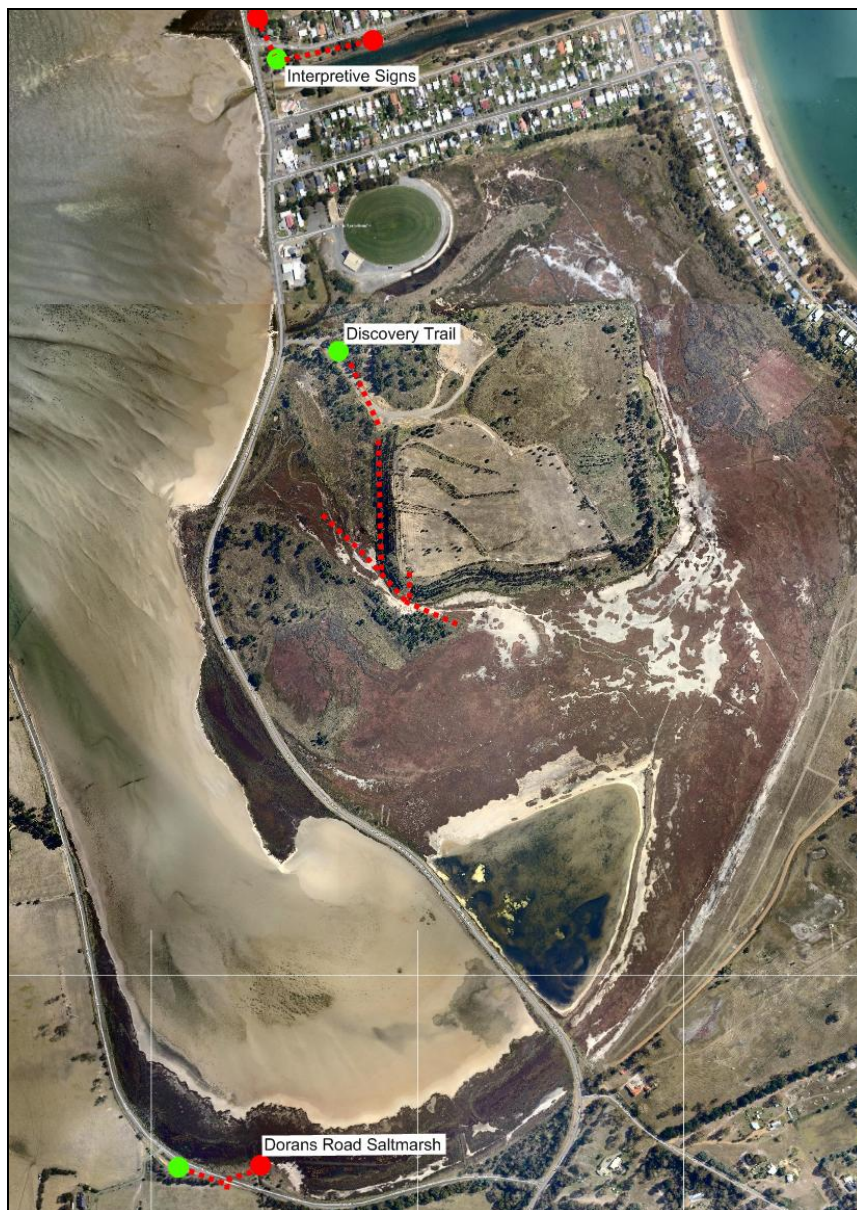
- 'Saltmarsh interpretive sign'
- 'Coastal erosion interpretive sign'
- Dyson Road Saltmarsh

Lauderdale Saltmarsh Discovery Trail - Info Pack

Site orientation:

Upon arrival at Lauderdale and before embarking on the Saltmarsh Discovery Trail we recommend an initial stop at two interpretive signs (YET TO BE INSTALLED) for views over the saltmarsh and tidal flats of Ralphs Bay. Read info about saltmarsh animals and ecological roles of this habitat type. Located at the junction of South Arm Road and North Terrace.

Also, after the completion of the Saltmarsh Discovery Trail we recommend a final stop at the nearby Dorans Road saltmarsh (Detailed site information available at the end of the Discovery points material). Park on road verge (turning circle at driveway) and take a short walk to a low vantage point over the saltmarsh and bay. Beware of traffic on the road and walk well away from the road edge.



Location and access:

Starts and finishes at the car park of the old Lauderdale tip. The walk takes you from the car park to the front gate of the old tip and along a mown track that follows the western fence line of the old tip, returning along same path. there are plans to line the track with gravel to provide easier walking in the future. Currently there are slopes that can get slippery in wet conditions so care must be taken, and children should be supervised at all times.

Distance:

800m long track, 1.6km return.

Walk time:

30 mins nonstop, 50 mins with Discovery points, 70 mins with activities.

Safety:

Using the maps and other materials provided brief the class/group on where you are going, how long it will take, what time you will return and what they will need to bring. Complete a safety briefing for your group highlighting the risks and controls for the activity. There are hazards such as steep inclines, slippery surfaces, prickly bushes. It is essential that all participants wear enclosed footwear, and a first Aid kit is carried by teachers/guides with first aid training.

Tide times:

It is recommended the arrival to the site is scheduled to coincide with low tide. Consult a tide table <http://www.bom.gov.au/oceanography/tides/> to determine the appropriate time and date to visit the Lauderdale saltmarsh to view the tidal flats.

Materials Required:

- Appropriate shoes and clothing (hat, sunglasses, sunscreen)
- First aid kit
- Map
- Lauderdale Saltmarsh Discovery Trail Educational Material and Map
- Field sheets and pencil, for students to record observations and facts
- Magnifying glasses (at least one per group of 3)
- Binoculars (if available)
- Cameras (if available)



Discovery Point 1

Overview of saltmarsh and tidal flats

BACKGROUND

Saltmarsh and tidal flats are types of habitat

- Habitat is the area or environment where an organism or ecological community normally lives or occurs
- You find saltmarsh and tidal flats where the land meets the sea.
- The intertidal zone is the area of the coastline exposed at low tide and underwater at high tide.
- In the intertidal zone of sheltered bays and coves fine sediments accumulate to form tidal flats. The muddy and sandy sediments in tidal flats are deposited by the marine environment by tidal movement or from the land in runoff (surface water or ground water that enters creeks, rivers and the ocean).
- Low lying areas on the landward side of tidal flats may be inundated by seawater during storms and floods. A wide range of plants grow in these low lying salty wetlands, and are collectively known as saltmarshes.
- Although named saltmarshes, they are often also reliant on fresh water flushes either through rain events accumulating over low lying areas, or along drainage lines that pass through the saltmarsh.
- Saltmarshes and tidal flats are a vital component of an estuary as they are the food factories and maintenance teams, and play many other important roles.

Saltmarsh health requires connectivity with tidal flats



Next to the car park is a drainage line that enables saltwater inundation into saltmarsh, and flooding to drain out onto tidal flats

- This drainage line enables the flow of seawater into the saltmarsh at high tides. The pipes under the road provide a connection between the tidal mudflats in the bay and the saltmarsh inland. However, the road has largely blocked off connection between these two habitat types, and this is the only site of connectivity, with a restricted flow of seawater into the saltmarsh.
- The road forms a barrier that has stopped the flushing of organic material from the saltmarsh out onto the tidal flats.
- The reduction or complete blockage of connectivity between the tidal flats and saltmarsh has contributed to visible changes in the condition of the saltmarsh vegetation, with better quality vegetation on the seaward side of the road where more regular tidal inundation occurs.
- If there were not a bridge in the way fish could move in and out of the saltmarsh along these types of channels to seek refuge in the saltmarsh and feed.

Community Type: Burrowing invertebrates and microscopic algae of tidal flats



Sand crab



Air breathing snails

-The mud in this drainage line is an example of the type of mud occurring on the tidal flats in the other side of the road in the bay.

-This sticky mud can smell very bad. The odour is created from the invisible community of bacteria and algae busily working away to process organic matter and nutrients. These microscopic organisms are called 'micro-phyto-benthos'.

-Tidal flats may appear quite lifeless on first glance, but one square metre of sediment can contain up to 11,000 microscopic microalgae and invertebrates. Decaying plant material and nutrients from saltmarshes are flushed onto tidal flats providing 'fuel' for the tidal flat food chain. Bacteria and algae are at the bottom of the food chain, and are known as producers, who are fed on by a high diversity of burrowing invertebrates such as soft-shelled clams, worms, snails, and soldier crabs.

-Unlike rocky intertidal habitat, tidal mud flats don't provide attachment sites, shade, or hiding places for invertebrates. So residents usually dig a burrow to escape predation, and so they don't dry out when exposed during low tide.

-Many burrowing invertebrates have special adaptations to get sufficient oxygenated water in their burrows. They either pump water through their burrows, use siphons to draw it from the surface, or have special adaptations to tolerate low oxygen conditions.

Discovery Point 2
Saline sedgeland and rushland on fringe of saltmarsh

Community Type: Saline sedgeland and rushland



Sedge



Tetragonia implexicoma

-Some sedges, grasses, tussocks and shrubs are salt tolerant, and grow on higher ground within a saltmarsh or along the elevated fringes of a saltmarsh. Common species include) The salt tolerant *chaffy saw sedge Gahnia filum*, and sea rush *Juncus kraussii australiensis* are dominant at the Lauderdale saltmarshes, and the coastal tussock grass *Poa poiformis* and prickly spear grass *Austrostipa stipoides* is also common in this habitat.

-There are often many different species growing together, and they provide dense vegetation in which many saltmarsh animals shelter. Small native mice and antechinus shelter here, and may move out onto the saltmarsh at night time. Small birds like white-fronted chats, striated field wrens, and superb fairy-wrens also shelter and nest among this thick vegetation.

-Swamp harriers are a large brown hawk that commonly nest in sedgeland on the fringes of saltmarsh. They soar over open areas looking for small mammals and snakes with their wings in an upswept V-shape.

-Tetragonia is a common coastal creeping shrub. This same plant is important for little penguins in rocky coastal areas as it provides shelter for breeding birds.

Discovery Point 3 Succulent Herblands

Community Type: Succulent Herblands



Ground cover of different types of succulent herbs

- Succulent herblands occur in the saltiest and wettest low lying areas of a saltmarsh.
- Samphire, pigface, and wilsonia are examples of succulent herbs, and they grow together in a dense carpet that feels spongy when you walk on it.
- samphire is edible and is known as 'sea pickle' or 'poor man's asparagus'.

Succulence – an adaptation to salty conditions



Pigface



Glasswort (Samphire)

- The regular inundation and evaporation of seawater in saltmarshes means they are highly saline environments. Plants can only grow in these harsh conditions if they are salt tolerant.
- Many saltmarsh plants cope with high salt concentrations by storing water in their leaves to dilute the salt taken up from the soil. They then shed their salt filled leaves, or sweat salt which leaves a silky sheen on their leaves.
- These salt tolerant plants are called succulents.
- Saltmarshes are the kidneys of an estuary, filtering sediment from water running off the land, and acting as natural sponges, absorbing and reducing flood waters

Q: When you pick the leaf of a succulent plant what do you expect to find?

Discovery Point 4

Succulent shrubs

Community Type: Succulent Shrubland



Tecticornia arbuscula shrubland



Close up showing tiny yellow flowers

- Succulence (water storage in leaves) has arisen not only in low lying herbs like glasswort and pigface, but also in woody shrubs.
- Succulent shrubs are often called 'shrubby glassworts', and are very slow growing plants.
- They are ancient miniature forests, as shrubs up to 1 metre in height may be hundreds of years old.
- The largest succulent shrubs may reach 2 meters in height, and 3 meters across.
- Shrubby glassworts have segmented leaf lobes at the tips of their branches. These leaf lobes can be green to red in colour.
- Succulent shrubs, and very fragile. They are easily broken by livestock, vehicles, and people, so be careful not to damage them.
- Shrubby glassworts such as *Tecticornia arbuscula* grow on saltmarsh in Ralphs Bay in the Derwent estuary.
- They provide habitat for a wide range of animals, especially small mammals and birds who shelter in their branches, and invertebrates such as beetles, spiders, and the fragile air breathing snail who live among the leaves.

Discovery Point 5

Miniature animal community

Saltmarsh Invertebrates



*Wilsonia's trumpet
shaped flowers*



tiny snail



grasshopper

- Healthy productive saltmarshes support many different invertebrates (animals without backbones), from flying insects like butterflies, moths, mosquitoes and flies, to crawling spiders, beetles, and crabs, and sliding snail and worms.
- Most of them are very small and live among the vegetation.
- Succulent herbs have flowers of a range of sizes. Pigface flowers can be the size of your hand, while the trumpet shaped flowers of Wilsonias are tiny. Even smaller are the tiny specks of yellow pollen on the tips of beaded glasswort.
- The most common invertebrates in saltmarsh are snails (Gastropods). Most eat rotting plant material which helps recycle the nutrients in saltmarsh soils.
- Over 100 species of moths are known from the Lauderdale region. Some moths and butterflies rely entirely on saltmarsh plants. Several rare moths and butterflies live in the Lauderdale region, including the salt marsh looper moth, chevron looper moth, and chequered blue butterfly.

Did you know: Adult moths only live for a few weeks, and may not eat at all when they are in the adult flying stage of their life cycle. Instead they live on the nutrient they eat as pupae.

Activity

Use magnifying glasses to locate invertebrates



Use a magnifying glass to look closely among the succulent herbs.

What can you see?

- beetles, grasshoppers and snails in pigface and glasswort
- crabs in pigface and glasswort
- butterflies, dragonflies, and preying mantis in sedges and shrubs
- Look closely, you may see the cocoons of moths and butterflies

Do not try and capture the insects as they are easily damaged or killed.

Ask the students to choose one or two to sketch on paper

Discovery Point 6

Mosaic of different vegetation types

Elevation, salinity and vegetation



-When we stand back and look at the different vegetation types in a saltmarsh we can see that they are patchily distributed, and form a mosaic across the landscape. This patchiness is due to the varied salt tolerance of different plant types. Subtle changes in salinity that occur across a saltmarsh are determined by the regularity in wetting regime, which is influenced by elevation (high vs low-drainage channels), and by proximity to saltwater or freshwater sources.

Most salt tolerant = low lying areas Succulent herbs like pigface and glasswort
Succulent shrubs

Less salt tolerant = higher ground Sedges, grasses and rushes
Woodland

Annual cycles of the saltmarsh



Annual bloom of flowers in summer



Annual die back in autumn and winter

- Succulent plants put on a burst of growth in spring, produce bright flowers in summer, and then shed their salt laden foliage in autumn.
- This annual die-off of succulent plants provides a supply of mulch and detritus which is food and habitat for many invertebrates and detritus feeders.
- Tidal inundation and seepage transports much of this organic matter to the neighbouring tidal flat where algae called 'micro-phyto-benthos' absorb the nutrients and grow prolifically.
- This pulse of nutrients into the tidal flats is exploited by shorebirds. Many shorebird species migrate thousands of kilometres from the northern hemisphere, and feed on tidal flats to fuel their return flight.

Consider 'Sensory Exploration' activity

Discovery Point 7

A Fragile environment

Human impacts on saltmarsh



Trail bike activity is obvious from damaged vegetation

- Saltmarsh is highly fragile, especially the woody succulent shrubs. This means it is sensitive to disturbance, especially from stock grazing, vehicles, weed invasion, illegal clearing or land reclamation, and bushfire.
- Extensive loss of saltmarsh due to land reclamation and changes in land use mean that many remaining areas are often fragmented and shows signs of human disturbance.
- Historically saltmarsh were much more common in the Derwent estuary, and around the world. But with agricultural development and urbanisation many have disappeared. For example, many of the sporting fields along the Derwent foreshore were once wetlands, including Cornelian Bay, Geilston Bay and Wentworth Park.
- Due to constructed shorelines in many sheltered bays saltmarsh exist as a thin fringe along the shore.
- Nearby agricultural activity has affected the health of the saltmarsh. Large areas have been cut off from tidal influence by levees. Nutrients from fertilisers draining into the saltmarsh stimulate algal growth that smothers the plants. Dams and reservoirs reduce the flow of freshwater and sediment into the saltmarsh.

Q: Can you see any signs of:

- rabbit grazing, diggings, and rabbit scat/poo?
- motorbike tracks?

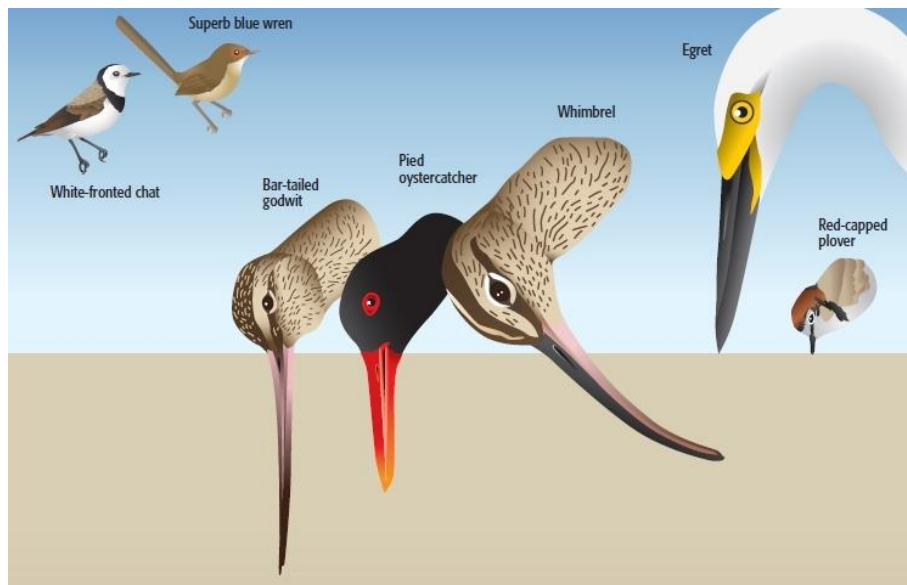
Q: What other types of damage can you see?

Q: what types of litter can you see?

Discovery Point 8

Bird diversity

Saltmarsh Birds



- A wide diversity of birds rely on saltmarshes and tidal flats.
- Here we can see how bushland and woodland fringing saltmarsh on elevated ground.
- Woodland in close proximity to saltmarsh provides opportunities for bushland birds to feed on saltmarsh insects and plants.
- Shorebirds are a type of bird that commonly feed on the muddy tidal flats when they are exposed at low tide. During high tide they come onto saltmarshes to seek shelter and rest. Many different species of shorebird can live in the same area (coexist) by feeding on different plants and animals in different ways.

Bird Anatomy

The shape and size of a birds beak, the length of their legs, or size of their wings provides an indication of where they feed and what they feed on.

- Shorebirds with long legs and long bills can feed in deeper water and probe deep into the mud to find bivalves, worms, and snails.
- Species with medium length legs and bills feed in the shallows, while short legged shorebirds prefer to feed at the waters edge or pick prey items off the surface of the exposed mud.
- Tiny field wrens and chats have short pointy beaks used to stab and eat insects and spiders from plants in the saltmarsh.

Discovery Point 9

View point from top of hill

Overview of system



View south from the top of the tip face

From this high point we can see the patchy nature of the saltmarsh habitat, and the fringing woodland with paddocks and houses on higher ground off in the distance. We can see Ralphs Bay, which is a large shallow area of seawater at high tide, and exposed tidal flats at mid – low tide.

The future of saltmarsh with sea level rise

-From here we can see a major threat to saltmarsh habitat with sea level rise. The construction of roads, and higher elevation paddocks behind mean that with rising sea level there are limited opportunities for saltmarsh to retreat. We really need to secure lands behind productive saltmarsh to ensure they can retreat naturally, which may involve removing barriers, etc.

-succulent herblands are quicker to adapt to changing conditions, and are expected to move inland with sea level rise. But the slower growing less shrubby glassworts may not keep up. These vegetation type may be squeezed out and become very rare in the future.

You're standing on a man-made hill!

-Saltmarsh has been under appreciated by people for a long time, and there are many examples around Australia where they have been used as dumping grounds for rubbish.

-This is an old tip site where solid waste had been dumped for 30 years.

-Since its closure in 2001 the tip has been capped, and revegetated with native grasses, shrubs and trees. It now presents a great site for recreational activities, and Clarence City Council is keen to see more people use the site for outdoor activities such as bicycle riding, kite flying, and kicking the footy.

Doran's Road Saltmarsh - A healthy System

Connectivity = fish nursery and healthy food chains



Drive to Dorans Road, park on road verge (turning circle at driveway,) and take a short walk to low vantage point over saltmarsh.

Beware of traffic when crossing the road!

- Here is an example of a healthy saltmarsh where there are no barriers. This means nutrients saltmarsh is regularly inundated during high tides, and plant matter from the saltmarsh can be flushed out onto the tidal flat. These natural processes mean that this habitat is in very good condition, compared to the saltmarsh we have just come from.
- Here we can see the many drainage channels of a healthy saltmarsh. This helps flush material out to the tidal flats, providing food for microscopic algae and the rest of the food chain. At high tide many species of fish swim into these channels to feed, or look for a sheltered places to rest.
- Saltmarshes in some parts of Tasmania act as nurseries for gummy and school sharks which are the basis of take away 'fish and chips'.
- Common fish that use shallow areas of Ralphs Bay include white-spotted dogfish, sand flathead, school whiting, yellow-eyed mullet and southern saw shark.
- The Derwent estuary is one of Tasmania's 11 Shark Nursery Areas, where sharks, skates and rays can breed and raise their young. Ralphs Bay and the tidal flats off Lauderdale are important nursery grounds for juvenile school and gummy sharks.
- Flounder, flathead and rays are bottom-dwellers who sift through sediment to feed on invertebrates.
- Small whiting and mullet provide prey for herons, cormorants, and water rats.

The many benefits of saltmarsh

- Saltmarshes are food factories supplying organic material for food webs both in the saltmarsh and tidal flats, and they provide food and shelter for a high diversity of plants and animals.
- They act as a buffer zone between land and water, stabilising shorelines against erosion, and protecting it from storm surges
- They help to keep waterways healthy by filtering sediment, nutrients and pollution from freshwater runoff

Q: *Can you think of any other important values of saltmarsh?*