

Lutregala Marsh, Bruny Island – notes on the physical character, history and geomorphology

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Introduction

Lutregala Marsh is a natural coastal salt marsh/wetland located at the southern end of the isthmus or neck connecting North and South Bruny Island, at the outlet of Simpsons Creek (Fig 1). Most of the marsh area was privately owned, and used for cattle grazing, until 1994, when it was part sold and part donated to the Tasmanian Conservation Trust. The Tasmanian Land Conservancy purchased the 41.9 ha property from the Conservation Trust in 2005.

The author undertook a brief review of the area in 2015/16, in terms of its geomorphological and geological attributes and possible significance, since these factors had been little studied or commented on. Three days' field work were carried out in September 2015, when the author, accompanied by his wife for part of the time, walked over much of the area. Some further study has been done using air photo images, and some research into historical usage.



Figure 1. Topographic setting of Lutregala Marsh, from Adventure Bay 1: 25000 map sheet (1983)

Access

The main access point is by means of a sand track, now somewhat overgrown, through the forested area in the NE corner, adjacent to the main road. This track probably represents a continuation of the original 'road' along the beach from North to South Bruny (Davis, 1990). Access to the western part of the marsh is via a narrow right of way from Simpsons Bay Road. The southern part may be accessed by walking across neighbour's paddocks, and the northern delta area by walking along the beach.

Physical description

Lutregala Marsh is located at the southern end of the Bruny Island Neck on its northern side. The Neck here is about 1.5 km wide. The marsh fronts on to Simpons Bay, which is a particularly sheltered part of the low-energy coast of D'Entrecasteaux Channel, not subject to large swells or waves. There is consequently a very wide inter-tidal sand flat here, extending seaward for over 1 km, backed by a narrow beach without significant dunes (Fig. 2).



Figure 2. Recent Google image showing context of Lutregala Marsh. TLC boundary shown in red.
Note wide inter-tidal sand flat in Simpsons Bay, change in foreshore at Simpsons Creek delta
since 1983 map (Fig. 1).



Figure 3. Google air photo image of Lutregala Marsh and surrounds (2015). TLC boundary shown.

The marsh is roughly circular in shape, about 700 m across, and is essentially flat. A spot height of 3 m is shown on the contour map (Fig. 1) towards the southern margin. The northern part is dominated by tidal

channels of the Simpsons Creek delta (Figs 3, 4). The marsh has a covering of brownish grasses, herbs, sedges and low shrubs except around the southern and eastern margins, where some taller tea tree scrub is encroaching. It is bounded to the east by low forested sandy country, with some sand ridges evident on photos, a few metres above sea level (Fig. 3). This area is traversed by the main north-south road, and has scrub-covered swampy country further east. The sand ridges on the forested sandy country curve from N-S into an E-W orientation as they approach the coast to the north, and continue west and SW as a narrowing 'hook' or wedge which projects into the central part of the marsh (Fig. 3). This wedge-shaped belt of forested sandy country is only a metre or so above sea level, and has a slightly undulating ground surface rather than a dune form. To the south and west of the marsh are mainly cleared paddocks where the tea tree scrub and forest vegetation have been removed.

Vegetation on the marsh is a variable mixture of herbs, grasses, sedges and shrubs, forming a complex mosaic in many areas. Two main types have been recognised in Tasveg mapping. **Saline hermland** is dominated by a groundcover of beaded glasswort or samphire (*Sarcocornia quinqueflora*) intergrown with shiny swampmat (*Selliera radicans*), with a variable admixture of tussock grasses, sedges and shrubs. It forms open areas like small flat 'paddocks' in places (Fig.5), but tends to be grassy and/or shrubby (with *Sclerostegia arbuscula*, *Melaleuca gibbosa*, *Rhagodia candolleana*) on the lower parts of the delta. Areas dominated by grasses and sedges form **saline sedgeland/rushland**, with the dominants being coast spear grass (*Stipa stipoides*), sea rush (*Juncus kraussii*), chaffy saw sedge (*Gahnia filum*) and salt grass (*Distichlis distichophylla*). This type is more abundant around the eastern and southern parts of the marsh, where the grassy vegetation is quite dense in places (Fig. 6).



Figure 4. View east across northern part of Lutregala Marsh and delta of Simpsons Creek from Simpsons Bay Road. Note major outlet channels, tidal channels, shrubby to grassy vegetation.

Figure 5. Open area of saline hermland, fringed by saline sedgeland with *Sclerostegia* bushes, near western point of forest land. Hermland is dominated by *Sarcocornia quinqueflora*.





Figure 6. View SE across dense saline sedgeland/ rushland in eastern part of Lutregala Marsh, towards encroaching scrub/forest.

The forest vegetation on the sandy country has *Eucalyptus amygdalina* and scattered *E. viminalis* and *E. ovata* over *Banksia marginata*, *Monotoca elliptica*, *Acacia verticillata* and *Leptospermum scoparium*, with bracken, saggs and low shrubs (Fig. 7). Tea tree is more abundant towards the swamp margins, particularly *Leptospermum scoparium*, *Melaleuca squarrosa* and *M. gibbosa*.

Figure 7. Forest vegetation along the northern access track at the TLC boundary marker. Note remains of old tractor left by a previous owner.



The marsh appears to owe its existence to the outflow of Simpsons Creek, which rises some 5 km to the SW in the South Bruny Range and flows across the marsh into Simpsons Bay. The main channel of the creek trends NE into the centre of the marsh, close to the point of the 'hook' of sandy forested country, then swings north and debouches northwards on to the wide intertidal sand flat of Simpsons Bay. Thus the northern part of the marsh represents the **tidal delta** of Simpsons Creek (Fig. 4), and it is the outflow of fresh water combined with the inflow of salt water which maintains the marsh – and presumably prevents it from being replaced by wind-blown sand. The delta mouth area consists of three main outflow channels and a network of tidal inflow channels which extend inland for several hundred metres, with flat salt marsh in between.

The eastern part of the marsh is wrapped to the east and north by the belt of forested sandy country, and is densely vegetated with grasses and sedges. It is poorly drained and difficult to move about in. A small creek (or possibly several small creeks) enters this part of the marsh near its SE corner, in an area where drainage lines are poorly defined. This creek meanders northwards into the swampy central area, where it becomes difficult to see on photos, before apparently linking up with a well defined tidal channel coming off

the main channel to the west near the point of the 'hook'. This single tidal channel seems to be responsible for maintaining the salt marsh character of most of this eastern half of the marsh, which has something of the aspect of an abandoned older delta. A second tidal channel 100 m further upstream is linear and appears to be a man-made drainage channel. The margins of the marsh in this area are being colonised by scrub and forest migrating in from the east and south.

Man-made drainage works

There appear to have been a number of attempts over many years to drain parts of the marsh for agriculture. Remnants of drainage ditches and furrows are clearly visible on air photos, particularly older ones (Fig. 8). The largest structure is a ditch and associated embankment, a metre or so high, running for some 400 m along the eastern/southern bank of Simpson Creek from the higher ground in the SW to the point of sand forming the 'hook' (Figs 8,9,10). According to Julian Punch (pers. comm. Feb 2016), this was done by previous owner Arthur Bain in about 1980, using a bulldozer, in an attempt to keep salt water out of the eastern half of the marsh. Wooden tidal gates were constructed at the two main tidal channels, suspended from logs dragged across the channels (Fig. 11). These were supposed to stop salt water from entering, but allow fresh water to flow out. It is uncertain how effective they were.



Figure 8. 2005 Google image of Lutregala Marsh to show man-made drainage features.
Note channel, with associated embankment, parallel to Simpsons Creek, linear drainage ditch
in centre of marsh, with pattern of orthogonal furrows to the SW.

Another water-filled drainage ditch is present at the northern margin of the eastern marsh (Fig. 8). This one extends from the marsh into the forested area, where it becomes dry, and is marked by a dip in the access track. It was presumably meant to help drain the central part of the eastern marsh, but appears not to have been effective.



Figure 9. Looking NE along part of the man-made channel, with associated embankment to its left, beside Simpsons Creek (seen to left)



Figure 10. View NE along top of man-made embankment beside Simpsons Creek



Figure 11. View SE across Simpsons Creek and along linear drainage ditch extending into eastern part of marsh. Note log to which previous tidal gate was attached.

The obvious linear ditch trending SE off the main creek channel (Fig. 11) for about 200 m is man-made, and appears to be associated with the pattern of orthogonal furrows in two 'paddock' areas to the SW of the ditch. Julian Bush (pers. comm.) suggests that these furrows and ditches pre-date the river-bank ditch, but their timing remains uncertain. There are faint traces of drainage structures extending off the southern end of this linear ditch, one to the east across the main part of the eastern marsh, and another to the south to possibly link up with a small creek coming off the paddocks.

Examination of the area adjacent to the linear ditch shows a flat, open, relatively well drained 'paddock'-like area covered with *Sarcocornia/Selliara* saline hermland fringed with grasses/sedges (Fig. 12). Small depressions show wet reddish muddy soil. Numerous hoof-prints from cows were present, possibly several years old. A larger paddock-like area of similar saline hermland vegetation is present on the western side of the creek channel in this area, also with numerous hoof-prints (Figs 13, 14).



Figure 12. View NE across the 'paddock' area of saline hermland on SW side of linear drainage ditch. Vegetation dominated by *Sarcocornia quinqueflora* – looking dry and brown in this case – with a green underlayer of *Selliara*. Note reddish muddy waterlogged soil in small depression, and numerous cattle hoofprints.



Figures 13, 14. Two views of the 'paddock' area of saline hermland on NW side of Simpsons Creek in central part of marsh, looking NE and NW respectively. Note saline pool and abundant hoof marks.

Although no detailed studies have been conducted, the strong impression gained from the field observations is that the human drainage works have been largely ineffective in draining the marsh or in providing arable land. Further historical studies might reveal if any success was had in growing crops on the 'ploughed' land. A small amount of introduced 'fog grass' was noted in the area, suggesting some planting of exotic species was tried in an attempt to improve the pasture quality. It seems likely that the marsh soils for the most part have been too waterlogged and salty for successful cultivation, and hence the salt marsh vegetation remains dominant.

Former footbridge

A wooden footbridge was constructed across the mouth of the delta in 1923 (Davis, 1990), to allow people to walk from the then end of the road along Neck Beach to properties at Simpsons Bay. A road to South Bruny was not constructed until 1950. The remains of the footbridge are still visible across the vegetated part of the delta and across the tidal sand flat (Figs 15, 16, 17).

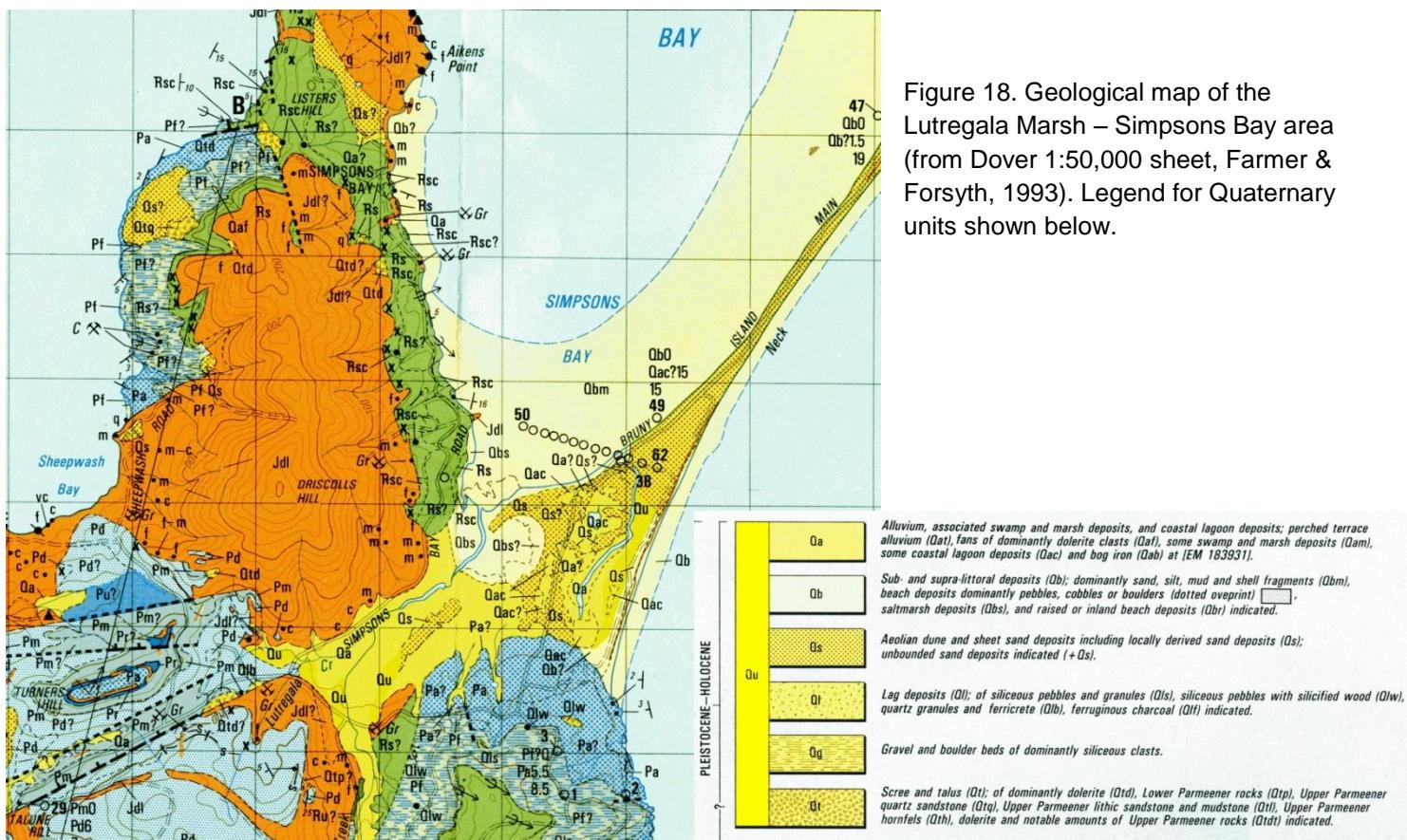


Figures 15, 16, 17. Remains of walkway; picture of walkway from western end, taken in 1932 (Davis, 1990); and line of walkway across delta mouth.



Geology and geomorphology

The geology map (Fig. 18) shows the typical units of South-East Tasmania are represented in this area, with Jurassic dolerite (orange) on the higher ground, underlain by Triassic sandstone (green) around the Simpsons Bay Road area, and various Permian mudstone formations (blue) to the south and west. A series of roughly E-W faults probably accounts for the gap through which the Alonna main road passes.



The Quaternary story is of most interest in the present context. Quaternary deposits extend well inland along Simpsons Creek and Lutregala Creek, indicating that this area was probably a marine embayment during times of higher sea level. A small delta related to Simpsons Creek would have been present in the area since Tertiary times (2+ million years), and may well have controlled the location of the southern end of the isthmus during sand buildup between the original islands. A series of shallow drill holes across the sand flat and neck area just east of Lutregala Marsh (the line of circles on the map) reached depths of up to 25 m in various littoral sandy facies, but bedrock is likely to be much deeper. The very narrow Neck, which appears somewhat fragile, consists mainly of sand dunes and wind-blown sand built up by wave action from Adventure Bay acting on the very large sand body extending well into Isthmus Bay.

A gravity survey was conducted along The Neck by the Mines Department in 1975 (Leaman, 1975). The survey showed a deep channel beneath the sandy isthmus to a depth of about 250 m, infilled with presumed Tertiary-age sediments (Fig. 19). This is interpreted to represent the original channel of the North-West Bay River, which, at a time of extreme low sea level, would have flowed down the valley now forming the northern part of D'Entrecasteaux Channel, then south-eastwards through Isthmus Bay and Adventure Bay, probably to join the ancestral Derwent somewhere under Storm Bay. This channel, like that known to underlie the Derwent in its lower reaches, would have been partially re-excavated and infilled a number of times during the various low and high sea levels associated with the Pleistocene glacial and inter-glacial periods. It was probably infilled for the last time as sea level rose after the last glacial stage, from about 10,000 years ago, drowning the ancient river valleys and producing the present ria coastline. Development of the sandy tombolo, or isthmus, joining North and South Bruny, would have followed this infilling, mainly built up by the strong wave action and associated sand movement in Adventure Bay.

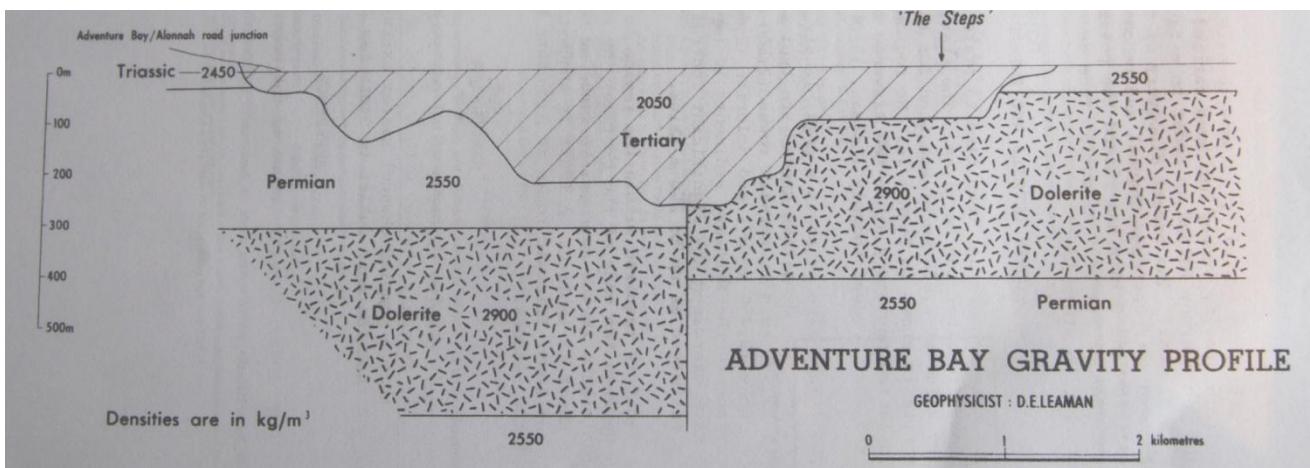


Figure 19. Geological section along the Neck, interpreted from gravity survey by D E Leaman (1975). Note deep Tertiary river channel to 250 m.

The Simpsons Creek delta would have changed and evolved with the sea level changes, and with the development of the sandy isthmus. The associated salt marsh would have developed once the isthmus was formed and sand had filled Simpsons Bay to shallow levels, to give a large area of tidal influence around the small delta.

The processes operating at the Lutregala Marsh have not really been studied, nor have the soils or history of the area been examined by means of cores or trenches. Salt marsh can only exist if there is at least intermittent inundation by salt water. This may only occur with particularly high spring tides in the upper parts of the salt marsh, the consequent evaporation producing the requisite saltiness to support the salt-tolerant plants. At Lutregala, it appears that the fringes of the salt marsh to the south and east are gradually being colonised by tea tree scrub and forest, probably related to sand encroachment and diminishing tidal penetration. Some of the artificial drainage works may have enhanced this process, although it also possible that some shrubby vegetation was cleared in earlier times and is now returning.

Possible influence of sea level rise

A first pass survey of the possible impact of sea level rise on the coast of Bruny Island (and other parts of Kingborough Municipality) was recently undertaken by Sharples and Donaldson (2014). These authors noted that erosion of the northern part of Isthmus Bay beach by wave action was already occurring due to sea level rise, although the southern, more sheltered section of the beach was not showing such damage. It was suggested that there was a risk of the Bruny Island Neck being breached, and the road destroyed, in response to erosion from either or both sides some time during the next few decades, if sea level rise continued. In the Lutregala Marsh area, there was a risk of inundation of the marsh during storm surge events following a sea level rise of 1-2 m, and particularly if the storm surge was accompanied by heavy rain and flooding of Simpsons Creek.

Summary and conclusions

- Lutregala Marsh is quite a large salt marsh related to the outflow of the relatively small Simpsons Creek, which debouches via a tidal delta on to the very broad low-energy tidal flat of Simpsons Bay. The delta and marsh have developed at the southern end of the Bruny Island Neck, which formed during the Pleistocene following infill of the original deep channel of the North West Bay River between North and South Bruny.
- The form and origin of the eastern part of the marsh, which is largely wrapped by low-lying sandy forest, are puzzling. It may represent an abandoned earlier delta, or part thereof, but it is not clear where the outflow for this would have been.
- The salt marsh appears relatively stable. Some encroachment of scrub vegetation into the eastern part possibly reflects drying out of this part and some influx of wind-blown sand.

- Comparison of modern photos and the 1983 map suggests the delta and associated salt marsh have advanced seawards about 150 m over some three decades, but this requires checking.
- A number of attempts have been made to modify the marsh by drainage, for agricultural purposes. These attempts appear to have been basically unsuccessful, in that it is still essentially a salt marsh. It would be a worthwhile study to document the drainage works to determine what was done and when, and what the results were, to give an idea of the resilience of salt marshes to such activities. For example, were any crops successfully grown on the drained land? Examination of earlier air photos – back to the 1930's or beyond – would be a starting point, and some of the families involved (eg the Bains) may still be contactable.
- Sea level rise has the potential to impact on the marsh by tidal inundation associated with storm surges and very high tides during the next few decades. This process may in part be counteracted by a decreasing flow in Simpsons Creek related to the general drying, and consequent drying out of the delta.

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