

# Dune Swale

## Karumba



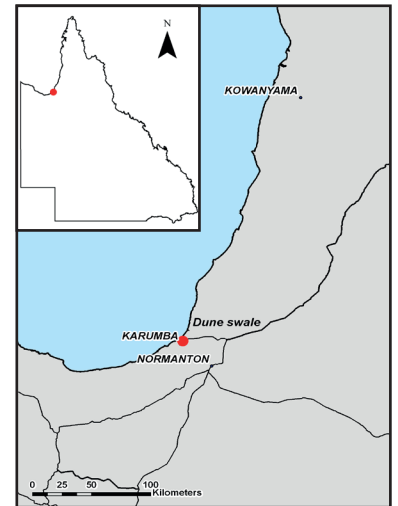
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### Study Area

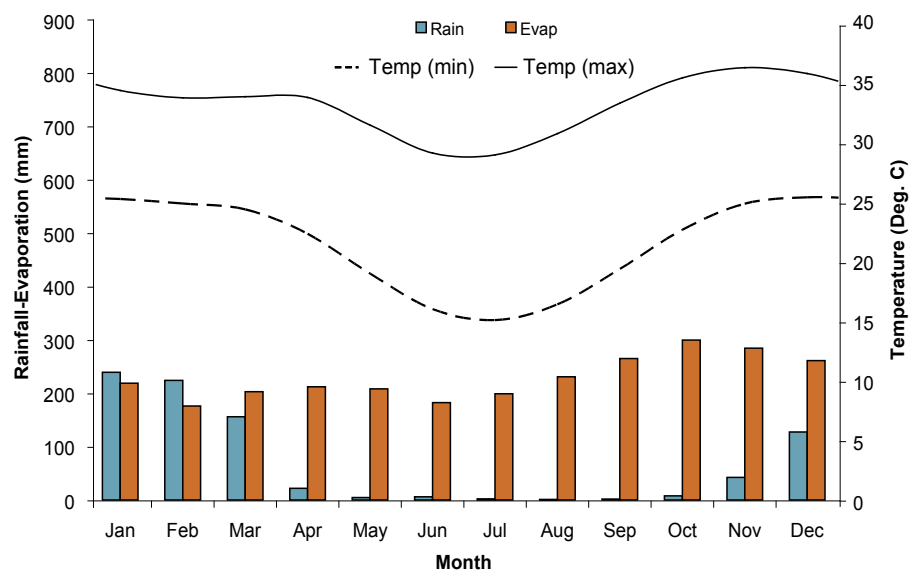
This transect is located in a dune swale system approximately 2 km north of Karumba, Northern Queensland.

This area is a complex of landform elements consisting of dunes, foredunes, beach ridges, beaches, swales, tidal flats, intertidal flats, estuaries, tidal creeks, stream channels, stream beds, gullies, drainage depressions, swamps, lakes and oxbows<sup>1</sup>.

The study area is characterised by melonhole clay soils and is an example of a coastal and sub-coastal non-floodplain grass, sedge, herb swamp in the Gulf Plains Bioregion.



### Climate<sup>2</sup>



The study area is situated within a tropical/equatorial climatic region with a distinct wet and dry season. Evaporation exceeds rainfall in the majority of months. The average annual rainfall for the area is 835 mm.

<b>Landform and Inundation</b>	Dune swale within a beach ridge system Predominantly freshwater periodic inundation from overland flow
<b>Soils<sup>3</sup></b>	Hydrosols, Tenosols and Vertosols
<b>Vegetation<sup>4</sup></b>	Secondary dunes and swales (RE 2.2.2)
<b>Geology<sup>5</sup></b>	Beach ridges and undivided coastal deposits
<b>Disturbance</b>	No effective disturbance except grazing by hoofed animals



Australian Government



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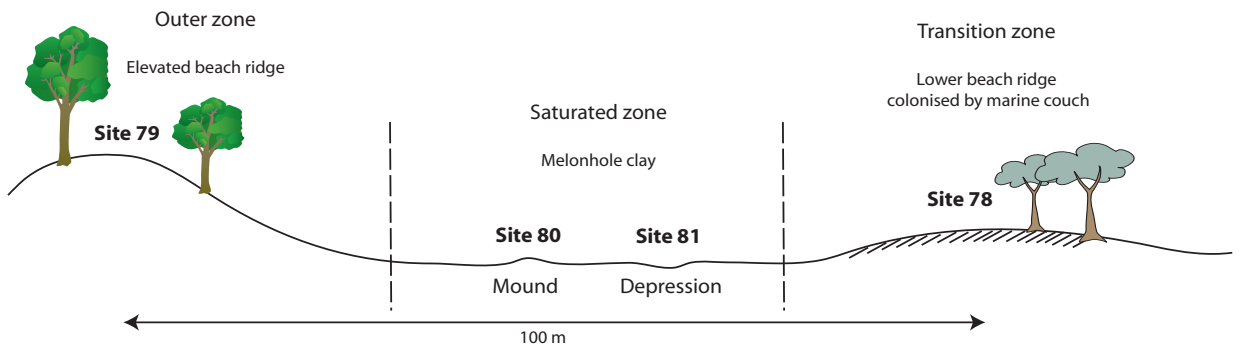
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## Location

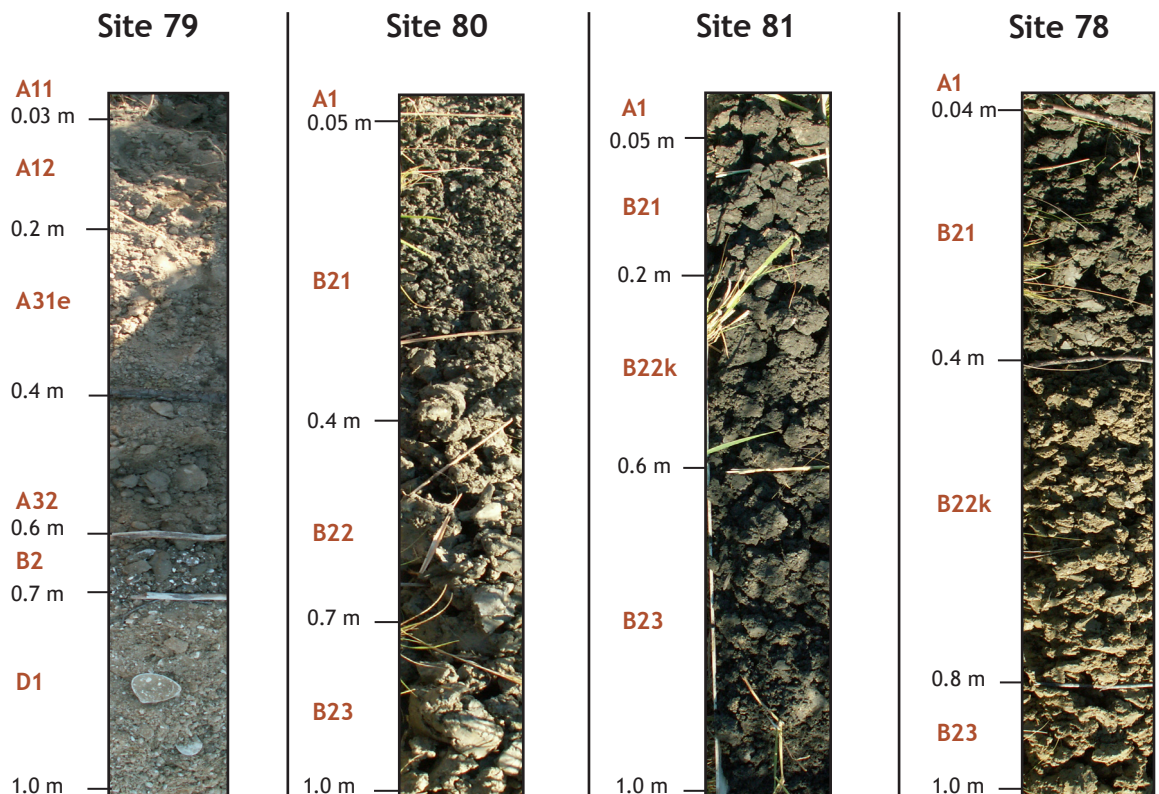
GDA94 • MGA Coordinates : 484129 E, 8068219 N, Zone 54 • Lat/Long : -17.47203 S, 140.85051 E



## Landscape Diagram



## Soil Profiles



## Soil Indicators Present (within 0.3 m of surface)

Indicator <sup>6</sup>	Site 78	Site 79
Organic materials and organic carbon (OC)*	No organic materials OC: 0.91%	No organic materials OC: 0.34%
Matrix colour	Dark grey	Grey to brown
Chroma (thickness of layer)**	Present (0.3 m)	Present (0.3 m)
Mottles and Segregations	Not present	Not present
Depth to groundwater	Not present	Not present
Ferruginous root channel and pore linings	Not present	Not present
pH* <sup>7</sup>	Strongly alkaline	Neutral
Texture	Silty light clay to light medium clay	Loamy fine sand
Acid sulfate material	Not present	Not present
Electrical Conductivity (EC) <sup>7</sup>	Moderately saline	Non saline
Indicator <sup>6</sup>	Site 80 (mound)	Site 81 (depression)
Organic materials and organic carbon (OC)*	No organic materials OC: 0.81%	No organic materials OC: 1.57%
Matrix colour	Dark grey	Dark grey
Chroma (thickness of layer)**	Present (0.3 m)	Present (0.3 m)
Mottles and Segregations	Few 2-6 mm calcareous nodules	Few <2 mm calcareous nodules
Depth to groundwater	Not present	Not present
Ferruginous root channel and pore linings	Not present	Present
pH* <sup>7</sup>	Moderately alkaline	Slightly acid
Texture	Medium heavy clay to heavy clay	Light medium clay to medium clay
Acid sulfate material	Not present	Not present
Electrical Conductivity (EC) <sup>7</sup>	Non saline	Non saline

\*Organic carbon % (Dumas method) and pH taken from surface (0-0.1 m)

\*\*Chroma value is less than or equal to 2

## Summary of Field Observations

- No mottling present within 0.3 m of the soil surface however sub-surface mottling is more significant, indicating water fluctuation at depth in the saturated and transition zones
- Gilgai microrelief present in saturated zone
- Depression site within the saturated zone is more indicative of a wetland soil with ferruginous root channel linings and significant increased organic carbon content compared to the mound site (0.81% - mound to 1.57% - depression)
- Dark surface colours in the transition and saturated zone indicative of a reduced environment where there is organic accumulation
- Evaporative profile and high EC levels in transition zone appears to be due to a capillary fringe effect and the evaporation of salts at the surface



Soil Morphology

Site 78		Classification			Australian Soil Classification			Mesotrophic, Dermosolic, Oxyaquic Hydrosol		
		Boundary			Landform Element			Swale		
		Texture			Morphological Type			Open depression		
Horizon	Depth (m)	Colour	Mottles	Coarse Fragments	Structure	Segregations	Consistence			
A1	0 to .04	very dark grey (5Y31)	none	none	strong 10-20 mm angular blocky	none	strong dry			
B21	.04 to .4	dark grey (5Y41)	none	none	moderate 10-20 mm angular blocky	none	very firm moist			
B22k	.4 to .8	olive grey (5Y52)	common (10-20%) fine (<5 mm) faint yellow mottles	common (10-20%) shell (10-20%) shell very weak small pebbles (2-6 mm)	moderate 10-20 mm angular blocky	common (10-20%) medium (2-6 mm) calcareous nodules, common (10-20%) fine (<2 mm) calcareous soft segregations	very firm moist			
B23	.8 to 1	olive (5Y53)	common (10-20%) medium (5-15 mm) distinct orange mottles, very few (<2%) medium (5-15 mm) distinct grey mottles, few (2-10%) fine (<5 mm) faint grey mottles	few (2-10%) shell very weak small pebbles (2-6 mm)	massive	very few (<2%) medium (2-6 mm) calcareous nodules	firm moist			

Site 79		Classification			Australian Soil Classification			Basic, Silpanic, Grey-orthic Tenosol		
		Boundary			Landform Element			Beach ridge		
		Texture			Morphological Type			Rise		
Horizon	Depth (m)	Colour	Mottles	Coarse Fragments	Structure	Segregations	Consistence			
A11	0 to .03	dark grey (10YR41)	none	none	massive	none	-			
A12	.03 to .2	dark greyish brown (10YR42)	none	none	massive	none	-			
A31e	.2 to .4	greyish brown (10YR52)	none	none	massive	none	-			
A32	.4 to .6	brown (10YR53)	none	none	massive	none	-			
B2	.6 to .7	dark greyish brown (2.5Y42)	none	none	massive	none	-			
D1	.7 to 1.1	light brownish grey (2.5Y63)	none	many (20-50%) subangular shell medium pebbles (6-20 mm), few (2-10%) subangular shell large pebbles (20-60 mm)	single grain	none	none			
D2	1.1 to 1.4	yellow (2.5Y75)	none	none	single grain	none	-			

Site 80		Classification		Australian Soil Classification				Epicalcareous-Epiphersodic, Crusty, Black Vertosol	
				Landform Element		Swale			
				Morphological Type				Open depression	
Horizon	Depth (m)	Boundary	Texture	Colour	Mottles	Coarse Fragments	Structure	Segregations	Consistence
A1	0 to .05	clear to	heavy clay	very dark grey (10YR31)	none	none	strong 10-20 mm angular blocky	none	very firm dry
B21	.05 to .5	gradual to	medium heavy clay	very dark grey (2.5Y31)	none	none	strong 5-10 mm lenticular, strong 5-10 mm angular blocky	few (2-10%) medium (2-6 mm) calcareous nodules	firm moderately moist
B22	.5 to .7	gradual to	heavy clay	dark grey (2.5Y41)	few (2-10%) fine (<5 mm) faint yellow mottles	few (2-10%) subrounded shell small pebbles (2-6 mm)	moderate 2-5 mm lenticular, strong 2-5 mm lenticular	none	firm moist
B23	.7 to 1	-	heavy clay	dark grey (2.5Y41)	few (2-10%) fine (<5 mm) distinct pale mottles, few (2-10%) fine (<5 mm) faint orange mottles	none	strong 2-5 mm lenticular	none	firm moist

Site 81		Classification		Australian Soil Classification				Epicalcareous-Epiphersodic, Crusty, Black Vertosol	
				Landform Element		Swale			
				Morphological Type				Open depression	
Horizon	Depth (m)	Boundary	Texture	Colour	Mottles	Coarse Fragments	Structure	Segregations	Consistence
A1	0 to .05	clear to	light medium clay	very dark grey (10YR31)	none	none	strong 10-20 mm angular blocky	few (2-10%) fine (<2 mm) ferruginous root linings	strong dry
B21	.05 to .2	clear to	light medium clay	very dark grey (10YR31)	none	none	strong 5-10 mm angular blocky	none	firm moist
B22k	.2 to .6	clear to	medium clay	very dark grey (10YR31)	none	none	moderate 5-10 mm lenticular	few (2-10%) fine (<2 mm) calcareous nodules	firm moist
B23	.6 to 1	-	medium clay	very dark grey (2.5Y30)	none	none	moderate 5-10 mm lenticular	none	firm moist

## Soil Chemistry

Site	Depth (m)	pH*	EC (dS/m)	Cl (mg/kg)	NO <sub>3</sub> -N (mg/kg)	TC%**	TN%**
78	0.00-0.10	8.8	3.42	4130	<1	0.91	0.04
	0.20-0.30	9.1	2.64	3210	<1	0.42	<0.03
	0.40-0.50	9.4	2.02	2110	<1	0.55	<0.03
79	0.00-0.10	6.8	0.03	<20	<1	0.34	<0.03
	0.20-0.30	6.8	0.01	<20	1	0.11	<0.03
	0.40-0.50	7.2	0.02	<20	<1	0.18	<0.03
80	0.00-0.10	8.3	0.14	50	7	0.81	0.07
	0.20-0.30	9	0.37	351	1	0.63	0.04
	0.40-0.50	9.1	1	950	<1	0.6	0.04
81	0.00-0.10	6.1	0.14	24	82	1.57	0.12
	0.20-0.30	7.7	0.09	26	17	0.97	0.05
	0.40-0.50	8.5	0.18	56	<1	0.82	0.05

\*Aqueous 1:5

\*\*Total carbon and total nitrogen

### Electrical Conductivity

Electrical conductivity (EC) is a measure to describe the salinity, or the presence of soluble salts, of water, a soil water extract or suspension<sup>8</sup>. In the saturated zone between the mound and depression sites there is a distinct difference in the EC profiles. Salts are being leached out of the surface 0.5 m of the soil profile in the depressional site compared to the mound site (Figure 1). Water will pond in the depressional areas allowing more water (and salt) to move down the soil profile.

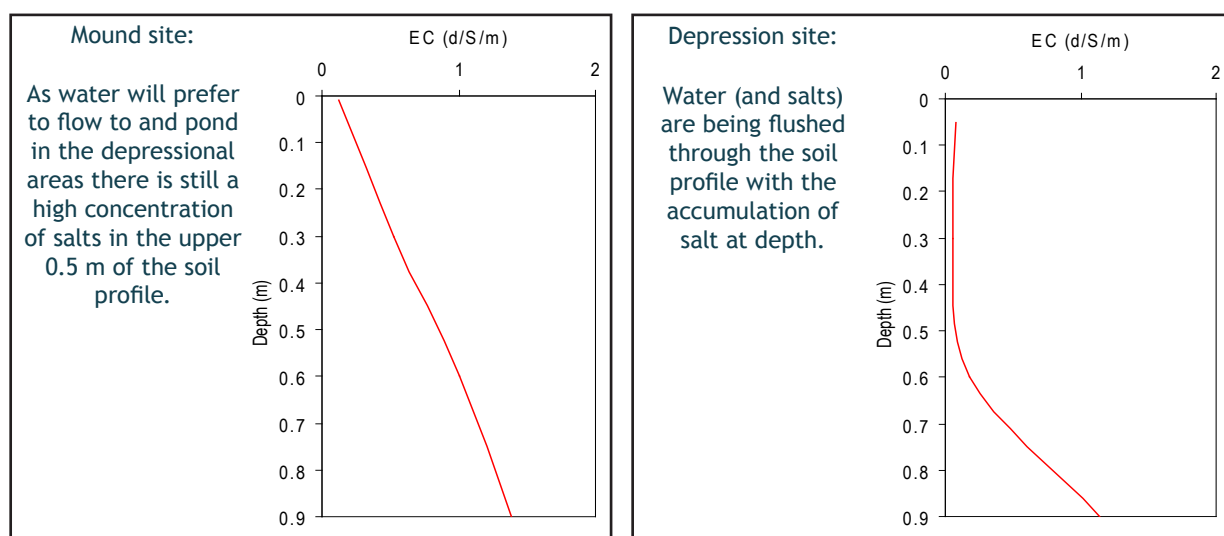


Figure 1. EC profiles for mound and depression site within a dune swale system

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