Soil Indicators of Queensland Wetlands

Goorganga Plain

Tidal Flat

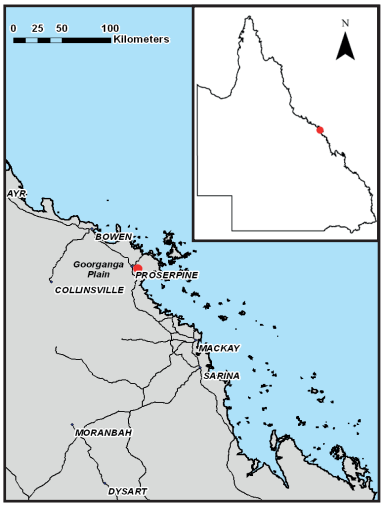
Queensland Wetlands Program

Study Area

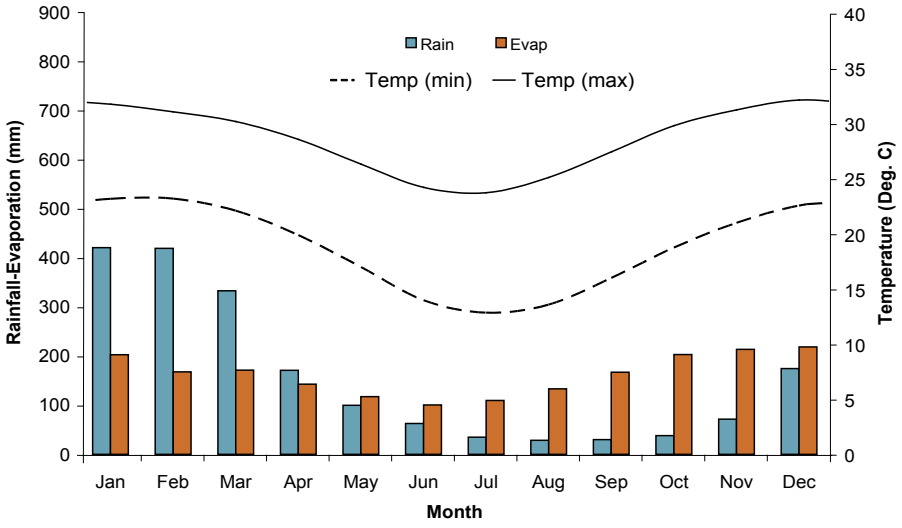
Goorganga plain is situated approximately 6 km south-east of Proserpine, Central Queensland.

Goorganga plain is the largest floodplain in the Central Queensland Bioregion and has extensive areas of seasonally inundated grasslands[1].

This transect is an example of a tidal estuarine wetland on a coastal floodplain within the Central Queensland Bioregion.



Climate[2]



The study area is situated within a subtropical 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 1886 mm.

Landform and Inundation	Mangrove swamp on a tidal flat Freshwater periodic inundation from overland flow and saline to brackish tidal inundation
Soils[3]	Hydrosols
Vegetation[4]	*Melaleuca* spp. and/or *Eucalyptus tereticornis* and/or *Corymbia tessellaris* woodland to open forest (estuarine wetland) with a ground stratum of salt tolerant grasses and sedges, usually in a narrow zone adjoining tidal ecosystems (RE 8.1.5) *Sporobolus virginicus* grassland on marine sediments. Estuarine wetland (RE 8.1.3)
Geology[5]	Coastal mud, silt and minor evaporites
Disturbance	No effective disturbance except grazing by hoofed animals

Australian Government

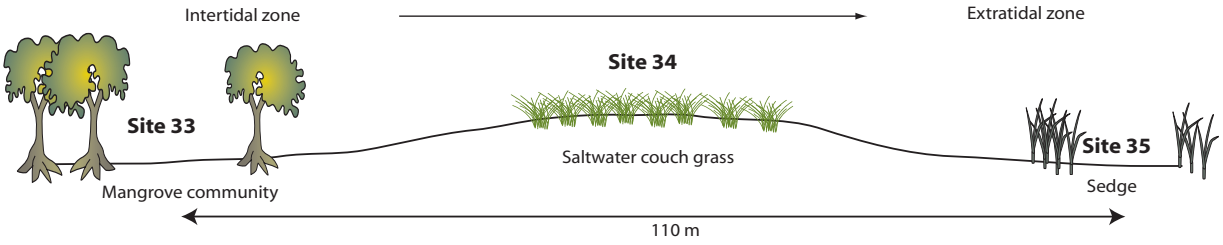
Queensland Government

Queensland Wetlands Program

Location

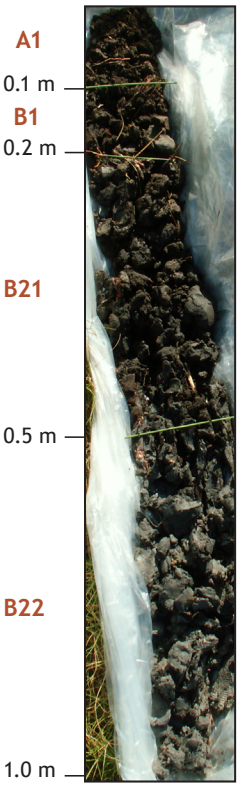
GDA94 • MGA Coordinates : 671548 E, 7741062 N, Zone 55 • Lat/Long : -20.42107 S, 148.64420 E

Landscape Diagram



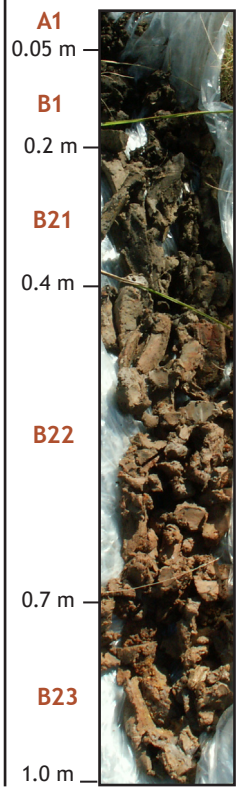
Soil Profiles

Site 33



Presence of organic material, high organic carbon content, dark grey surface colours and mottles are all positive indicators of a waterlogged environment

Site 34



Dark grey surface colours, mottles and manganiferous segregations are all positive indicators of a periodically inundated area

Site 35

Dark grey surface colours, mottling and ferruginous root channel linings are all indicative of a periodically inundated area

Soil Indicators Present (within 0.3 m of surface)

Indicator[6]	Site 33	Site 34	Site 35
Organic materials and organic carbon (OC)*	Organic materials layer 0.1 m thick starting within 0.3 m OC: 13.1%	No organic materials OC: 3%	No organic materials OC: 4.16%
Matrix colour	Greyish brown to grey	Dark grey to greyish brown	Dark grey to black
Chroma (thickness of layer)**	Present (0.3 m)	Present (0.3 m)	Present (0.3 m)
Mottles and Segregations	Very few <5 mm faint brown mottles	Very few <5 mm distinct yellow mottles	Very few <5 mm distinct red mottles Very few 5-15 mm faint grey mottles Very few <5 mm faint orange mottles
Depth to groundwater	Not present	0.9 m	Not present
Ferruginous root channel and pore linings	Not present	Not present	Present
pH*[7]	Slightly acid	Slightly acid	Strongly acid
Texture	Clay loam to heavy medium clay	Heavy medium clay	Medium clay
Acid sulfate material	Not present	Not present	Not present
Electrical Conductivity (EC)[7]	Slightly saline	Moderately saline	Moderately saline

**Organic carbon % (Dumas method) and pH taken from surface (0-0.1 m)*
***Chroma is less than or equal to 2*

Summary of Field Observations

- Organic materials in intertidal zone suggest area is inundated frequently
- Dark soil colours and low chroma values are indicative of reducing conditions
- Faint, distinct and prominent mottling are indicative of water fluctuation throughout all soil profiles (Figure 1)
- Manganiferous segregations at depth and ferruginous root channel linings suggest periodic inundation at sites 34 and 35

Figure 1. Distinct mottling.

Soil mottling or the presence of more than one soil colour is usually an indication of poor drainage or water fluctuation throughout a soil profile

References

1. DEWHA (2008). Australian Wetlands Database. [online]. Available at http://www.environment.gov.au/water/publications/environmental/wetlands/database/ [accessed 21/08/08].

2. Queensland Department of Natural Resources and Water (2008). SILO [online]. Available at http://www.longpaddock.qld.gov.au/silo/ [accessed 5/11/2007].

3. Isbell RF (2002). The Australian Soil Classification. CSIRO Publishing, Collingwood, Victoria, revised edition.

4. EPA (2008) Regional Ecosystems. [online]. Available at http://www.epa.qld.gov.au/nature_conservation/biodiversity/regional_ecosystems/ [accessed 28/06/08].

5. Bureau of Mineral Resources (1971). Proserpine: Australia 1:250,000 Geological Series, Bureau of Mineral Resources, Canberra.

6. Bryant KB, Wilson PR, Biggs AJW, Brough DM and Burgess JW (2008). Soil Indicators of Queensland Wetlands: State-wide assessment and methodology. Queensland Department of Natural Resources and Water. Brisbane.

7. Hazelton P and Murphy B (2007). Interpreting Soil Test Results: What do all the numbers mean?. [2nd ed]. CSIRO publishing. Collingwood Victoria.

Soil Morphology

Site 33		Classification		Australian Soil Classification			Intertidal Hydrosol		
				Landform Element			Intertidal Flat		
				Morphological Type			Flat		
Horizon	Depth (m)	Boundary	Texture	Colour	Mottles	Coarse Fragments	Structure	Segregations	Consistence
A1	0 to .1	-	sapric clay loam	very dark greyish brown (10YR32)	none	none	massive	none	-
B1	.1 to .2	-	heavy medium clay	very dark greyish brown (10YR32)	very few (<2%) fine (<5 mm) faint brown mottles	none	weak 2-5 mm angular blocky	none	-
B21	.2 to .5	-	heavy medium clay	very dark grey (10YR31)	very few (<2%) fine (<5 mm) faint brown mottles	none	weak 2-5 mm angular blocky	none	-
B22	.5 to 1	-	heavy light clay	very dark grey (2.5Y31)	few (2-10%) coarse (15-30 mm) faint grey mottles	none	weak 2-5 mm angular blocky	none	-

Site 34		Classification		Australian Soil Classification			Extratidal Hydrosol		
				Landform Element			Extratidal Flat		
				Morphological Type			Flat		
Horizon	Depth (m)	Boundary	Texture	Colour	Mottles	Coarse Fragments	Structure	Segregations	Consistence
A1	0 to .05	-	heavy medium clay	very dark grey (10YR31)	none	none	massive	none	-
B1	.05 to .2	-	heavy medium clay	very dark grey (10YR31)	very few (<2%) fine (<5 mm) distinct yellow mottles	none	massive	none	-
B21	.2 to .4	-	heavy medium clay	dark greyish brown (2.5Y42)	very few (<2%) fine (<5 mm) distinct yellow mottles	none	weak 2-5 mm angular blocky	none	-
B22	.4 to .7	-	medium clay	greyish brown (2.5Y52)	few (2-10%) fine (<5 mm) prominent red mottles, few (2-10%) fine (<5 mm) prominent yellow mottles	none	weak 2-5 mm angular blocky	very few (<2%) fine (<2 mm) manganiferous nodules	-
B23	.7 to 1	-	light medium clay	grey (2.5Y51)	few (2-10%) medium (5-15 mm) prominent yellow mottles, few (2-10%) fine (<5 mm) distinct red mottles	none	weak 2-5 mm angular blocky	very few (<2%) fine (<2 mm) manganiferous nodules	-

Site 35		Classification		Australian Soil Classification			Extratidal Hydrosol		
				Landform Element			Extratidal Flat		
				Morphological Type			Flat		
Horizon	Depth (m)	Boundary	Texture	Colour	Mottles	Coarse Fragments	Structure	Segregations	Consistence
A1	0 to .15	-	medium clay	very dark grey (10YR31)	very few (<2%) fine (<5 mm) distinct red mottles	none	massive	none	-
B1	.15 to .3	-	medium clay	black (2.5Y21)	very few (<2%) medium (5-15 mm) faint grey mottles, very few (<2%) fine (<5 mm) faint orange mottles	none	massive	none	-
B21	.3 to .65	-	heavy light clay	greyish brown (2.5Y52)	few (2-10%) medium (5-15 mm) distinct orange mottles, few (2-10%) medium (5-15 mm) distinct red mottles, few (2-10%) medium (5-15 mm) distinct brown mottles	none	massive	none	-
B22	.65 to .8	-	light clay	greyish brown (2.5Y52)	few (2-10%) medium (5-15 mm) distinct orange mottles	very few (<2%) angular pumice medium pebbles (6-20 mm)	massive	none	-

Soil Chemistry

Site	Depth (m)	pH*	EC dS/m	Cl mg/kg	NO3-N mg/kg	P mg/kg	S mg/kg	Ca meq/100g	Mg meq/100g	Na meq/100g	K meq/100g	Na corr meq/100g	Cu mg/kg	Zn mg/kg	Mn mg/kg	Fe mg/kg	TC** %	TN** %
33	0.00-0.10	6.4	1.88	3120	42	58	349	-	-	-	-	-	-	-	-	-	13.1	0.75
	0.20-0.30	6.9	2.04	3040	4	-	254	-	-	-	-	-	-	-	-	-	2.83	0.13
	0.40-0.50	6.8	2	2760	1	11	317	-	-	-	-	-	1.9	2.5	70.1	63.6	2.25	0.08
34	0.00-0.10	6.4	4.52	6730	6	43	643	-	-	-	-	-	-	-	-	-	3	0.2
	0.20-0.30	6.1	5.72	9470	1	16	988	3.79	15.2	33.9	1.8	7.23	0.8	0.9	4.3	80.2	0.85	0.04
	0.40-0.50	4.7	6.27	10900	<1	13	1140	3.48	14.3	38.4	1.55	7.81	0.7	0.5	1.3	85.1	0.48	<0.03
35	0.00-0.10	5.4	3.13	4080	1	-	686	-	-	-	-	-	-	-	-	-	4.16	0.33
	0.20-0.30	6	3.7	5850	3	37	762	5.84	15.1	30.5	2.6	14	1.1	2.6	9.5	177	1.76	0.12
	0.40-0.50	5.7	4.5	6470	1	12	744	3.17	10.5	26.7	1.42	8.47	0.5	0.4	4	52.4	0.42	<0.03

*Aqueous 1:5
**Total carbon and total nitrogen

9 311662 180643