

Elizabeth River and Estuary

Summary

Water quality at the upper estuary monitoring site is in excellent condition. Water quality at the ambient freshwater monitoring sites is in excellent condition and complies with water quality objectives. The water-bug community at most biological monitoring sites is equivalent to reference condition.

Nature of system

- Long residence time and poor flushing in the upper estuary
- Saltwater 'wedge' formation during the wet season – increasing freshwater flows to the estuary form a buoyant plume of freshwater which results in partially 'stratified' conditions
- Phytoplankton biodiversity typically greater in dry season
- Higher salinities in upper estuary during the dry season with no freshwater inputs
- Light limitation during the wet season

Sources of pollution

- High sediment and nutrient loads during the wet season from diffuse sources



View of lower Elizabeth River estuary looking towards Blaydin Point and Hudson Creek

Elizabeth River catchment showing rivers and monitoring sites

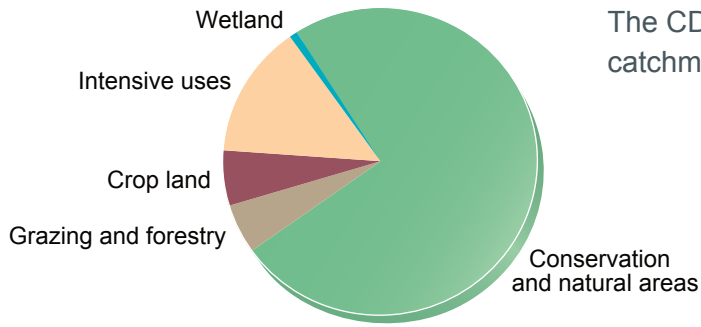


- ▲ Estuarine monitoring sites
- ▲ Freshwater and biological monitoring sites

0 6 12km



Land use in the catchment



Catchment disturbance index

The CDI for the Elizabeth River catchment is 0.84.

Water quality issues in the catchment



Mangroves help protect erosion of land surrounding the estuary.
Photo: George Maly














Construction in urban areas can contribute to increased pollutant loads to waterways. The city of Weddell is proposed in the Elizabeth River catchment.



Horticulture is an important industry but can be a source of pollutants such as nutrients and pesticides to waterways.

Elizabeth River catchment ambient freshwater water quality












Indicator and units	Water quality objective	Current condition	Number of samples	Compliance
 Electrical conductivity ($\mu\text{S}/\text{cm}$)	<200	32	11	✓
 Turbidity (NTU)	<20	6.5	12	✓
 pH	6.0–7.5	6.0–6.8	12	✓
 Dissolved oxygen (%)	50–100	70–82	11	✓
 Total suspended solids (mg/L)	<5	NA	NA	
 Chlorophyll a ($\mu\text{g}/\text{L}$)	<2	<1	12	✓
 NO_x ($\mu\text{g N}/\text{L}$)	<8	4	9	✓
 Ammonia ($\mu\text{g N}/\text{L}$)	NA	13	9	
 Total nitrogen ($\mu\text{g N}/\text{L}$)	<230	170	9	✓
 Total phosphorus ($\mu\text{g P}/\text{L}$)	<10	10	9	✓
 Filterable reactive phosphorus ($\mu\text{g P}/\text{L}$)	<5	3	9	✓

Period sampled for current condition is 2009. NA Not available

Biological health using the AUSRIVAS score

Site	2003	2009	Change
DW26	A	A	No change
DW39	A	B	Change
DW40	A	A	No change
DW44	A	A	No change
DW52	B	A	Change
DW53	A	A	No change
DW71		A	
DW72		A	

Elizabeth estuary ambient marine water quality

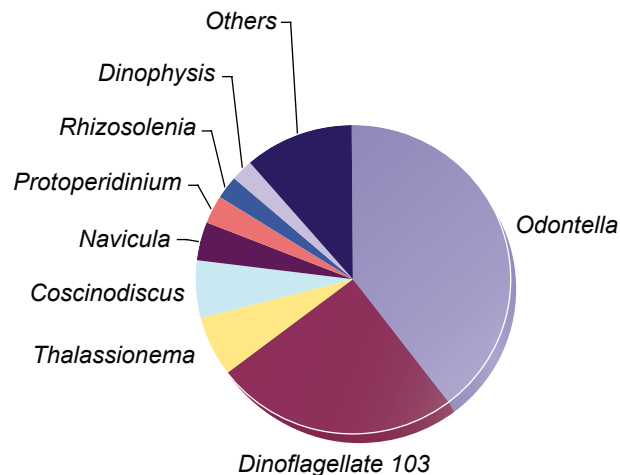
Indicator and units	Water quality objective	Current condition	Number of samples	Compliance
 Electrical conductivity ($\mu\text{S}/\text{cm}$)	NA	54250	6	
 Turbidity (NTU)	NA	3.6	6	
 pH	6–8.5	7.6–7.8	6	✓
 Dissolved oxygen (%)	80–100	58–65	6	*
 Total suspended solids (mg/L)	<10	17	6	*
 Chlorophyll a ($\mu\text{g}/\text{L}$)	<4	2	6	✓
 NO_x ($\mu\text{g N}/\text{L}$)	<20	4	6	✓
 Ammonia ($\mu\text{g N}/\text{L}$)	<20	11	6	✓
 Total nitrogen ($\mu\text{g N}/\text{L}$)	<300	255	6	✓
 Total phosphorus ($\mu\text{g P}/\text{L}$)	<30	13	6	✓
 Filterable reactive phosphorus ($\mu\text{g P}/\text{L}$)	<10	4	6	✓

Period sampled for current condition is Sep 2008 to Dec 2009. NA Not available. * WQO currently under revision

Other monitoring

Phytoplankton

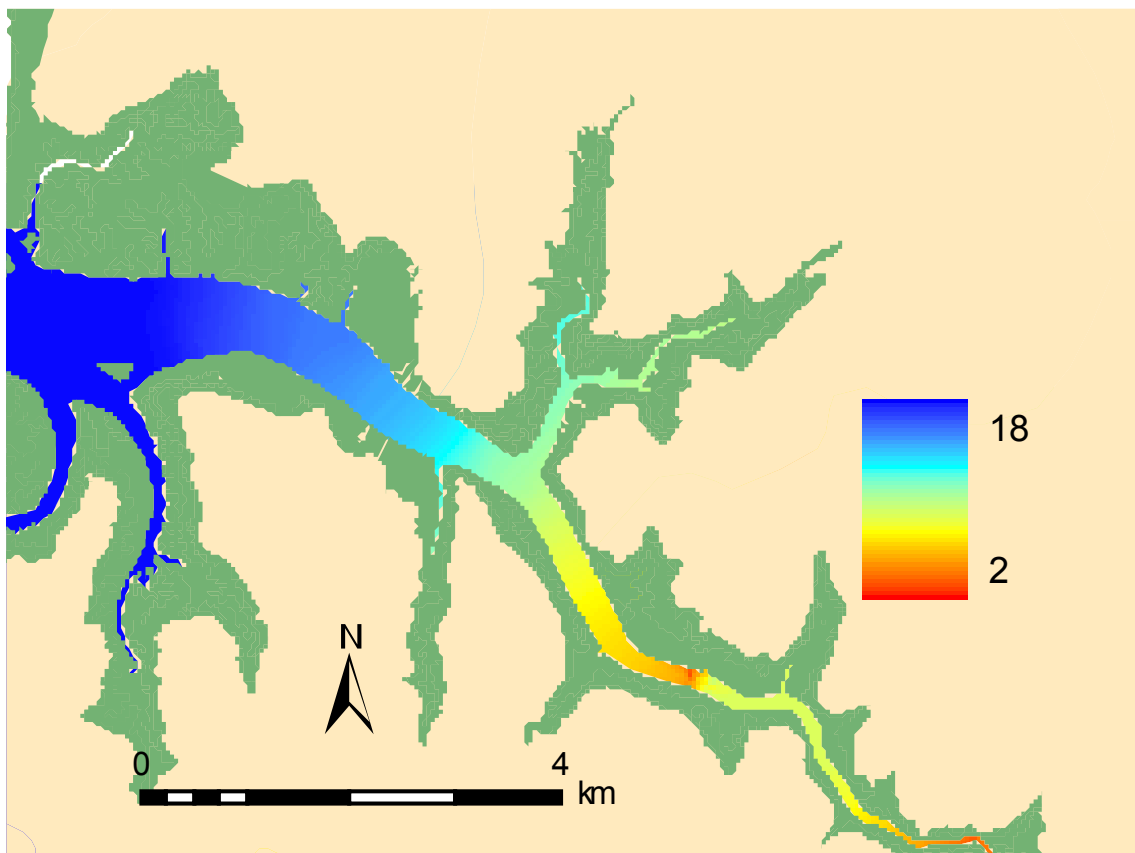
Phytoplankton (microscopic aquatic plants) community diversity has been studied in the Elizabeth River estuary. One hundred and sixteen phytoplankton taxa were identified in 29 samples from four sites in the 2006/07 wet season. These included 44 taxa of diatoms (Bacillariophyceae), 66 taxa of dinoflagellates (Dinophyceae) and small numbers of taxa of Chlorophyceae (1), Euglenophyceae (1), Cryptophyceae (2) and Cyanobacteria (2). Two taxa (the diatom *Odontella* and Dinoflagellate 103) comprised 65% of the total number of estimated cells. Monitoring studies in the dry and wet seasons of 2010/11 will examine spatial and temporal variation in phytoplankton communities in Darwin Harbour waters.



Water quality monitoring in a flood plume

Catchment runoff from storm events transports sediment, nutrients and pollutants to waterways. A flood plume was monitored in the Elizabeth River estuary on 3–4 March 2010 after 258 mm of rainfall during the previous nine days.

Flood plumes lower the salinity of receiving estuary waters. Normal marine water has a salinity of about 35 ppt. Salinity values ranged from 2–18 ppt during the plume. The outer estuary values of 18 ppt show strong influence of freshwater. Low salinity values in the upper estuary indicate mainly freshwater. Three weeks after the rainfall, salinity was 24–32 ppt showing that there was still some freshwater influence in the upper to mid estuary. These results show that the estuary is poorly flushed and has long water residence times.



Distribution of salinity (ppt) in Elizabeth River estuary, 3 March 2010. Red shading indicates low salinity values and is a natural occurrence after heavy rainfall.