Shoal Bay and Buffalo Creek

Summary

Water quality in outer Shoal Bay is in excellent condition. Several water quality indicators at some Shoal Bay upper estuary monitoring sites do not comply with water quality objectives, but water quality is in good condition. Water quality at the freshwater monitoring sites is in very good condition. The water-bug community is equivalent to reference condition at three out of four biological monitoring sites.

Estuarine water quality at monitoring sites in Buffalo Creek is in very poor condition. For some water quality indicators, water quality objectives are greatly exceeded. Of the sites monitored, the Buffalo Creek sites have the most degraded water quality in the Darwin Harbour region.

Nature of system

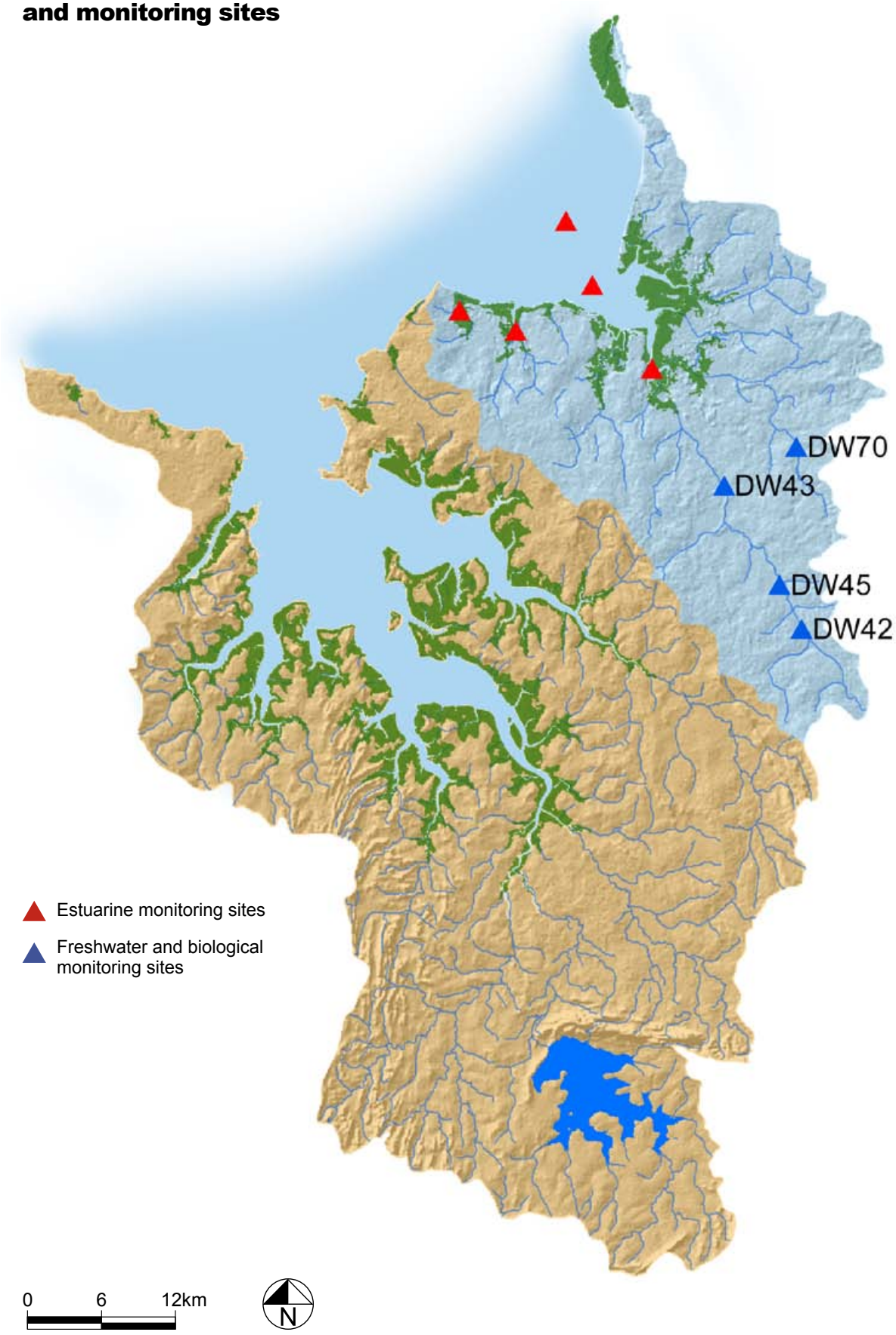
- Shallow embayment
- Series of sandbars changing with tides
- Light limitation during the wet season
- Perennial freshwater inflows from Howard River, typically most years in the wet and the dry seasons

Sources of pollution

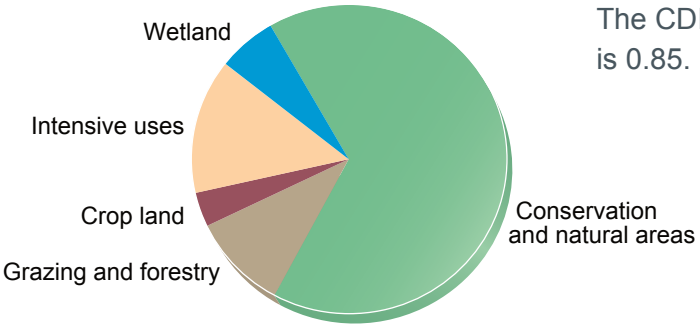
- Wet season diffuse source loads are received from the Howard and Shoal Bay sub-catchments
- Sediment and nutrient loads are high with runoff during the wet season
- Sewage treatment plant wastewater discharge at Buffalo Creek

Migratory shorebirds feeding between Lee Point and Buffalo Creek. Dogs are not permitted in this section of the beach to prevent disturbance to shorebirds as they provision for their northward journey. Photo: Brian Thistleton

Shoal Bay and Buffalo Creek catchment showing rivers and monitoring sites



Land use in the catchment

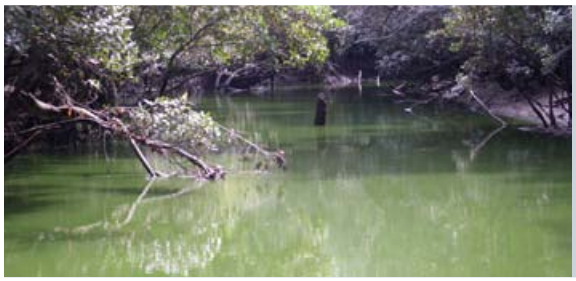


Catchment disturbance index

The CDI for the Shoal Bay catchment is 0.85.

Water quality issues in the catchment

Sampling sediment for assessing pollutant content near the Leanyer-Sanderson sewage treatment plant outfall.



Buffalo Creek receives treated wastewater discharge from the Leanyer-Sanderson sewage treatment plant. Water quality is poor.

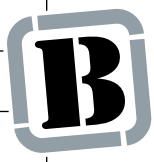
Lower Buffalo Creek is a popular recreation area, but subject to pollution from a sewage treatment plant.

Salvinia molesta is a free-floating aquatic fern that forms mats over water surfaces. Infestations can lead to degradation of water quality and reduced habitat quality for aquatic organisms. It occurs in the lower Howard River.

A grass swale (a water sensitive urban design feature), located in the centre of the road, is treating road runoff at Lyons residential development in Darwin before it discharges to Darwin Harbour.
Photo: Equatica

Shoal Bay catchment ambient freshwater quality

Indicator and units	Water quality objective	Current condition	Number of samples	Compliance
Electrical conductivity (µS/cm)	<200	39	8	✓
Turbidity (NTU)	<20	4.7	8	✓
pH	6.0–7.5	6.1–6.5	8	✓
Dissolved oxygen (%)	50–100	74–84	8	✓
Total suspended solids (mg/L)	<5	NA	NA	
Chlorophyll a (µg/L)	<2	<1	8	✓
NOx (µg N/L)	<8	3	8	✓
Ammonia (µg N/L)	NA	11	8	
Total nitrogen (µg N/L)	<230	260	8	✗
Total phosphorus (µg P/L)	<10	10	8	✓
Filterable reactive phosphorus (µg P/L)	<5	2	8	✓



Period sampled for current condition is 2009. NA Not available

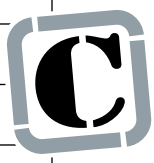
Biological health using the AUSRIVAS score

Site	2003	2009	Change
DW42	A	A	No change
DW43	B	B	No change
DW45	A	A	No change
DW70		A	

Shoal Bay upper area marine ambient water quality

Indicator and units	Water quality objective	Current condition	Number of samples	Compliance
Electrical conductivity (µS/cm)	NA	55000	10	
Turbidity (NTU)	NA	19	10	
pH	6–8.5	7.7–8.0	10	✓
Dissolved oxygen (%)	80–100	65–77	10	*
Total suspended solids (mg/L)	<10	38	10	*
Chlorophyll a (µg/L)	<4	7	10	✗
NOx (µg N/L)	<20	2	10	✓
Ammonia (µg N/L)	<20	15	10	✓
Total nitrogen (µg N/L)	<300	360	10	✗
Total phosphorus (µg P/L)	<30	28	10	✓
Filterable reactive phosphorus (µg P/L)	<10	10	10	✓

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



Outer Shoal Bay area marine ambient water quality

Indicator and units	Water quality objective	Current condition	Number of samples	Compliance
Electrical conductivity (µS/cm)	NA	53400	10	
Turbidity (NTU)	NA	3.4	10	
pH	7.0–8.5	8.0–8.3	10	✓
Dissolved oxygen (%)	80–100	71–78	10	*
Total suspended solids (mg/L)	<10	18	10	*
Chlorophyll a (µg/L)	<2	0.5	10	✓
NOx (µg N/L)	<20	1	10	✓
Ammonia (µg N/L)	<20	6	10	✓
Total nitrogen (µg N/L)	<270	180	10	✓
Total phosphorus (µg P/L)	<20	5	10	✓
Filterable reactive phosphorus (µg P/L)	<5	4	10	✓

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

Buffalo Creek marine ambient water quality

Indicator and units	Water quality objective	Current condition	Number of samples	Compliance
Electrical conductivity (µS/cm)	NA	49800	9	
Turbidity (NTU)	NA	17	9	
pH	6–8.5	7.3–8.0	9	✓
Dissolved oxygen (%)	80–100	38–66	9	*
Total suspended solids (mg/L)	<10	28	9	*
Chlorophyll a (µg/L)	<4	29	9	✗
NOx (µg N/L)	<20	76	9	✗
Ammonia (µg N/L)	<20	533	9	✗
Total nitrogen (µg N/L)	<300	1510	9	✗
Total phosphorus (µg P/L)	<30	375	9	✗
Filterable reactive phosphorus (µg P/L)	<10	318	9	✗

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

The Buffalo Creek monitoring site in the estuary is influenced by the treated wastewater discharged from the Leanyer-Sanderson sewage treatment plant outfall. The treatment plant is subject to a Waste Discharge Licence. In 2009, four additional sites were also monitored. All sites were between the outfall and upstream of the boat ramp. The licensed mixing zone is yet to be fully determined. It is possible that the Buffalo Creek monitoring site is located within the discharge mixing zone, and that the water quality objectives may not apply to this site.

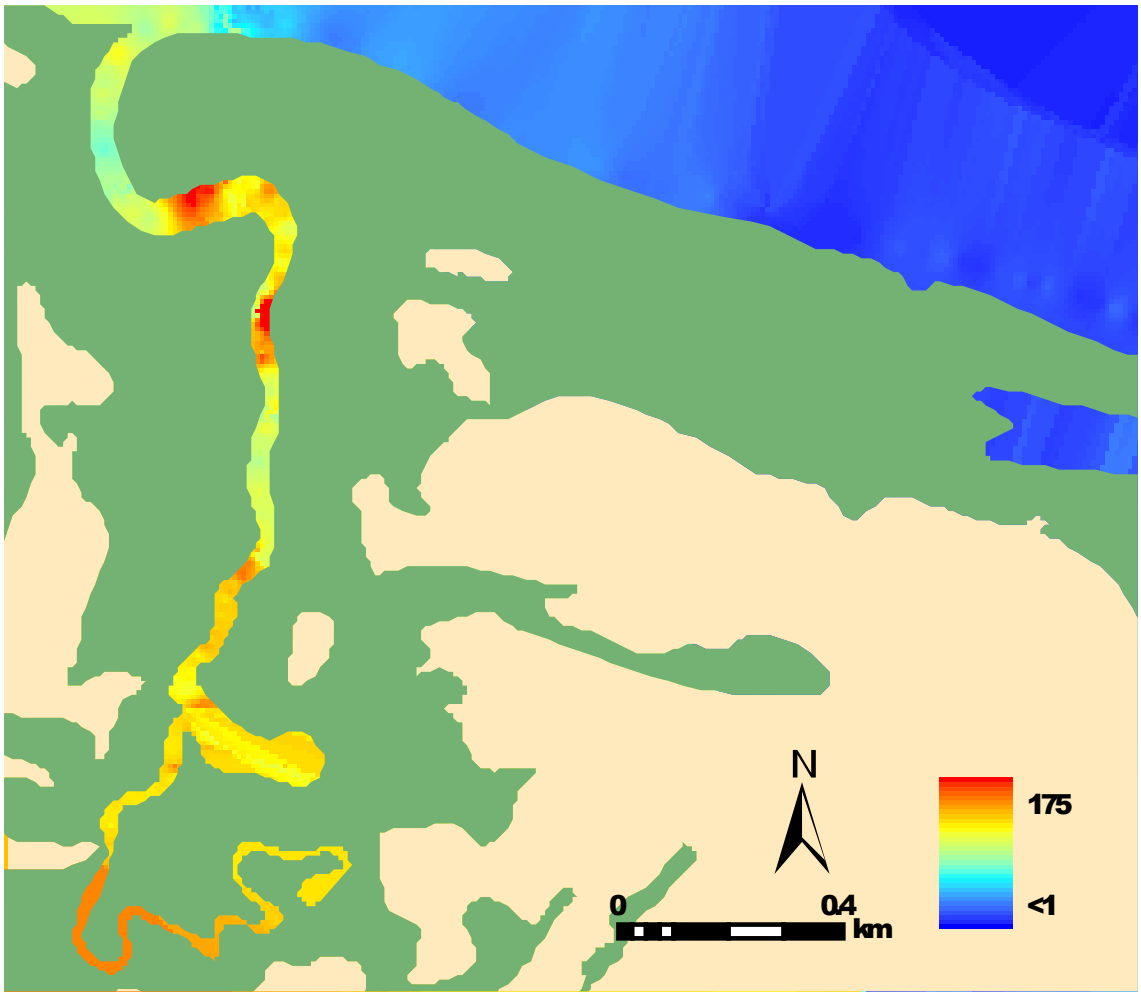
The Leanyer-Sanderson wastewater treatment plant uses a treatment system in waste stabilisation lagoons utilising a combination of sunlight, micro-organisms and algae to break down the raw wastewater. The presence of elevated concentrations of chlorophyll in Buffalo Creek may be largely due to the algae present in the treated wastewater discharge.

Other monitoring

Chlorophyll *a* mapping in Buffalo Creek

Chlorophyll *a* concentration in Buffalo Creek was mapped during the dry season in 2009 and wet season in 2010. In July 2009 chlorophyll *a* values were very high (>200 μg/L) in the upper estuary, with values <10 μg/L further downstream near a popular boat ramp.

In March 2010, chlorophyll *a* values were high (>80 μg/L) in the upper navigable part of the estuary. Greater chlorophyll *a* values (100–170 μg/L) were observed in parts of the mid estuary. Chlorophyll *a* values were approximately 60–75 μg/L near the boat ramp in the lower estuary, and <1 μg/L in Shoal Bay. The Darwin Harbour water quality objective for chlorophyll *a* is <4 μg/L for upper estuaries. These results show water quality in many parts of the estuary is in very poor condition.



Distribution of chlorophyll *a* (μg/L) in Buffalo Creek in March 2010.

Water quality sampling in Buffalo Creek. Buffalo Creek receives treated wastewater discharge from the Leanyer-Sanderson sewage treatment plant. Water quality is poor, with very high chlorophyll levels – hence the noticeable green colour of the water during this sampling. Photo: Julia Fortune