

Appendix O

ANZECC Indicators for State of the Environment Reporting

ANZECC Indicators for State of the Environment Reporting

Table O-1 ANZECC Indicators for State of the Environment Reporting (from ANZECC 2001)

Theme/issue	Core indicator
Atmosphere	
Climate variability	A1 Southern Oscillation Index, A2 Daily & extreme rainfall, A3 Average max. & min. temperatures
Enhanced Greenhouse Effect	A4 Greenhouse gas atmospheric concentrations, A5 Annual greenhouse gas emissions
Stratospheric Ozone	A6 Concentration of ozone depleting substances in the atmosphere, A7 Stratospheric ozone concentration A8 Recovery and destruction of ozone depleting substances, A9 Ultra-violet radiation levels at the surface
Outdoor Air Quality	A10 to A15 Exceedences of NEPM Air Quality standards for; carbon monoxide, ozone (photochemical smog), lead, nitrogen dioxide, sulphur dioxide, particles concentrations, A16 Emission of air pollutants
Biodiversity	
Threatening Processes	BD1 Native vegetation clearing, BD2 Aquatic habitat destruction, BD3 Fire regimes, BD4 Introduced species, BD5 Species outbreaks
Loss of Biodiversity	BD6 Extinct, endangered and vulnerable species and ecological communities, BD7 Extent and condition of native vegetation, BD8 Extent and condition of aquatic habitats, BD9 Populations of selected species
Biodiversity Conservation Management	BD10 Terrestrial protected areas, BD11 Marine and estuarine protected areas, BD12 Recovery plans, BD 13 Area revegetated
Land	
Land Use and Management	L1 Changes in land use
Erosion	L2 Potential for erosion, L3 Wind erosion from high wind events
Salinity	L4 Area of rising watertables, L5 Area affected by salinity
Acidity	L6 Area affected by acidity
Contamination	L7 Exceedences of the Maximum Residual Levels in food and produce
Inland Waters	
Groundwater	IW1 Groundwater extraction versus availability, IW2 Exceedences of groundwater quality guidelines
Surface Water	IW3 Extent of deep-rooted vegetation cover by catchment, IW4 Surface water extraction versus availability, IW5 Environmental Flows Objectives, IW6 Discharges form point sources, IW7 Surface water salinity, IW8 Exceedences of surface water quality guidelines, IW9 Freshwater algal blooms, IW10 Waste water treatment, IW11 Waste water reuse
Aquatic habitats	IW12 Vegetated stream lengths, IW13 River health (AUSRIVAS), IW14 Extent and condition of wetlands, IW15 Estimated freshwater fish stocks
Estuaries & the Sea	
Marine Habitat and Biological Resources	ES1 Changes in coastal use, ES2 Disturbance of marine habitat, ES3 Total seafood catch, ES4 Estimated wild fish stocks
Estuarine and Marine Water Quality	ES5 Coastal discharges, ES6 Maritime pollution incidents, ES7 Exceedences of marine and estuarine water quality guidelines, ES8 Bio-accumulated pollutants, ES9 Algal blooms in marine and estuarine environments, ES10 Waste water treatment, ES11 Disturbance of potential acid sulphate soils
Global processes	ES12 Sea level, ES13 Sea surface temperature
Human Settlements	
Energy	HS1 Energy use, HS2 Energy sources
Water	HS3 Exceedences of drinking water quality
Demographics	HS4 Urban green space, HS5 Residential density, HS6 Population distribution and number of people per dwelling, HS7 Visitor numbers
Transport	HS8 Public transport use, HS9 Fuel consumption per transport output
Waste	HS10 Solid waste generation and disposal
Community attitudes & actions	HS11 Community attitudes and actions

Appendix P

Water Quality Targets

Default Water Quality Targets For Tropical Queensland From Water Quality Targets Online

Table P-1 Aquatic Ecosystem Protection-Core indicators

Aquatic system	Total Nitrogen (TN)	Total Phosphorus (TP)	Turbidity	Salinity
Estuaries	250 micro g /L	20 micro g /L	1-20 NTU - Low values: offshore, coral dominated waters; High values: estuaries	Not applicable
Inshore Marine Waters	100 micro g /L	15 micro g /L	1-20 NTU - Low values: offshore, coral dominated waters; High values: estuaries	Not applicable
Offshore Marine Waters	100 micro g /L	10 micro g /L	1-20 NTU - Low values: offshore, coral dominated waters; High values: estuaries	Not applicable
Lakes and Reservoirs	350 micro g /L for turbid lakes only; Clear lakes have lower values	10 micro g /L	2-200 NTU - Low in deep lakes; High in shallow lakes; depends on geology, often wind induced	90-900 micro S/cm - Low: NT permanent billabongs; High: WA wetlands and in summer due to evaporation
Wetlands	350 micro g /L (WA riv pools- 1200 micro g /L)	10 micro g /L (WA riv pools- 50 micro g /L)	2-200 NTU - Low in deep lakes; High in shallow lakes; depends on geology, often wind induced	90-900 micro S/cm - Low: NT permanent billabongs; High: WA wetlands and in summer due to evaporation
Upland Rivers	150 micro g /L	10 micro g /L	2-15 NTU - Low values typical of NT base flow; QLD values variable, depend on catchment changes & seasonal runoff	20-250 micro S/cm-Low values are typical of NT ephemeral streams; High values during high flow and first flush events
Lowland Rivers	Rainforest- 200 micro g /L; OTHER-300 micro g /L	10 micro g /L	2-15 NTU - Low values typical of NT base flow; QLD values variable, depend on catchment changes & seasonal runoff	20-250 micro S/cm-Low values are typical of NT ephemeral streams; High values during high flow and first flush events

Table P-2 Aquatic Ecosystem Protection-Related indicators

Aquatic system	Nitrogen - Oxides of Nitrogen (NO _x)	Phosphorus - Filterable Reactive Phosphate (FRP)
Estuaries	30 micro g N /L	5 micro g P /L
Inshore Marine Waters	Coral Reef- 2 micro g N /L; OTHER- 8 micro g N/L	5 micro g P /L
Offshore Marine Waters	Coral Reef- 1 micro g N /L ;OTHER- 4 micro g N /L	Coral Reef- 2 micro g P /L; OTHER- 5 micro g P /L
Lakes and Reservoirs	NT- 5 micro g N / L; OTHER- 10 micro g N / L	5 micro g P /L
Wetlands	10 micro g N /L	5 micro g P /L (WA riv pools- 25 micro g P /L)
Upland Rivers	30 micro g N /L	5 micro g P /L
Lowland Rivers	10 micro g N /L	4 micro g P /L

Table P-3 Recreation - All Systems

	Salinity		Nitrogen		
	Sodium	Chloride	Ammonia (NH ₃)	Nitrate (NO ₃)	Nitrite (NO ₂)
Primary Contact	300 000 micro g/L	400 000 micro g/L	10 micro g N /L	44 300 micro g /L converted to nitrate	3 280 micro g /L converted to nitrite
Secondary Contact	300 000 micro g/L	400 000 micro g/L	10 micro g N /L	44 300 micro g /L converted to nitrate	3 280 micro g /L converted to nitrite
Aesthetics - No Contact	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable
	Turbidity and suspended solids Colour and appearance		Turbidity	Natural Reflectance	
Primary Contact	Not Applicable		For swimming Secchi disk (200mm diameter) sighted horizontally >1.6m	Not Applicable	
Secondary Contact	Not Applicable		Not Applicable	Not Applicable	
Aesthetics - No Contact	The natural hue of water should not be changed by more than 10 points on Munsell Scale		Natural visual clarity not reduced by more than 20%	Natural reflectance not changed by more than 50%	

No default values for Phosphorous

Table P-4 Drinking Water

	Nitrogen Nitrate (NO3)	Nitrite (NO2)	Ammonia (NH3)	Turbidity	Salinity Sodium	Chloride
Health Value	50 000 µg/L as Nitrate	3 000 µg/L as Nitrite	Not specified		Not Required	Not Required
Aesthetic Value (Taste & Odour)	Not Specified	Not Specified	500 micro g/L	5 NTU	180000 µg/L	250 000 µg/L

There are no default targets for Phosphorus.

Table P-5 Aquaculture/Human Consumption Aquatic Food

	Nitrogen Nitrate (NO3)	Nitrite (NO2)	Ammonia (NH3)
Freshwater	<50 000 µg/L	<100 µg/L	<20 µg/L (pH >8.0) coldwater; <30 µg/L warm water
Marine	<100 000 µg/L	<100 µg/L	<100 µg/L
	Phosphorus Phosphates	Turbidity Suspended solids	Colour & appearance
Freshwater	<100 µg/L	<40 000 µg/L	30-40 (Pt-Co units)
Marine	<50 µg/L	<10 000 µg/L (<75 000 µg/L Brackish)	30-40 (Pt-Co units)
	Salinity		
Freshwater	<4 500 µ S/cm		
Marine	49 000 - 55 000 µS/cm (4 500 - 52 000 µS/cm Brackish)		

Table P-6 Livestock Drinking Water

	Nitrogen Nitrate (NO3)	Nitrite (NO2)
Health Value	< 400 000 micro g /L; 1 500 000 micro g /L toxic	<30 000 micro g/L
Aesthetic Value	Not Relevant	Not Relevant

Salinity-Surface & Groundwater			
	Initial Effect -no effect	Moderate Effect - reluctance to drink + scouring	Major Effect - loss of production & condition
Beef Cattle	<6 000 micro S/cm	6 000 -7 400 micro S/cm	7 400 - 15 000 micro S/cm
Dairy Cattle	<3 700 micro S/cm	3 700 - 6 000 micro S/cm	6 000 - 10 400 micro S/cm
Sheep	<7 400 micro S/cm	7 400 -15 000 micro S/cm	15 000 -19 400 micro S/cm
Horses	<6 000 micro S/cm	6 000 - 9 000 micro S/cm	9 000 - 10 400 micro S/cm
Pigs	<6 000 micro S/cm	6 000 - 9 000 micro S/cm	9 000 - 12 000 micro S/cm
Poultry	<3 000 micro S/cm	3 000 - 4 500 micro S/cm	4 500 - 6 000 micro S/cm

There are no default targets for Phosphorus or Turbidity

Table P-7 Irrigation

	Total Nitrogen (TN)	Phosphorus - Total
Long Term Targets - up to 100 years	5 000 micro g/L	50 micro g/L
Short Term Targets - up to 20 years	25 000 -125 000 micro g/L STT Note: site-specific assessment needed	800-12 000 micro g/L STT Note: site-specific assessment needed

- Notes:
1. Turbidity - there are no default targets for this environmental value.
 2. **Long Term Targets** - those that should allow no deterioration in 100 years of use
 3. **Short Term Targets** - should allow no deterioration within 20 years of use. It is preferable to use the Long Term Targets.

Table P-8 Targets for Prevention of Foliar Injury

Prevention of foliar injury - (Note: values are presented as mg /L)		
	Sodium	Chloride
Sensitive	<115 mg/L (Almond; Apricot; Citrus; Plum; Grape)	<175 mg/L (Almond; Apricot; Citrus; Plum; Grape)
Mod. Sensitive	115-230 mg/L (Pepper; Potato; Tomato)	175-350 mg/L (Pepper; Potato; Tomato)
Mod. Tolerant	230-460 mg/L (Barley; Maize; Cucumber; Lucerne; Safflower; Sorghum)	350-700 mg/L (Barley; Maize; Cucumber; Lucerne; Safflower; Sorghum)
Tolerant	>460 mg/L (Cauliflower; Cotton; Sugar Beet; Sunflower)	