Noosa Integrated Catchment Assn. Inc.

WATERWATCH

NOOSA RIVER WATER QUALITY

ANALYSIS AND REPORT

2018 - 2019

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July 2019

NICA WATERWATCH ANALYSIS AND REPORT, JUNE 2019

SUMMARY

This report examines water quality data for the lower reaches of the Noosa River for the period June 2018 to July 2019. During this period responsibility for the Waterwatch program has been transferred from NDLC to NICA, and with new sites being added 28 test sites are now monitored to derive a more detailed view of the catchment.

It may be concluded that the Noosa River is in quite good condition and near compliant with the lowest level of compliance (80th percentile) of the DES water quality guidelines. The data for the tributary creeks draining from populated areas (Eenie, Cranks, and Wooroi) indicate that ongoing monitoring and greater control of those streams would be desirable. These would require measures to either reduce pollutants at their sources or to reduce their effects before reaching the river. A testing schedule of stormwater drain outlets is recommended. High levels of phosphate pollutants have been indicated but this requires further confirmation.

INTRODUCTION

This report covers Noosa catchment water quality tests made by NICA volunteers between June 2018 and July 2019. These have been analysed to compare them with proposed Dept. of Environment Water Quality Objectives (draft 2018) (ref 1), together with earlier data derived from records held on the HLW Envirocoms program back to 2005 when Waterwatch commenced.

During this period responsibility for the Waterwatch program has been fully transferred from NDLC to NICA, with all reporting made direct to Noosa Shire Council. NICA has instigated a number of new tests sites to derive a more consistent view of the river and its tributary creeks, and we now monitor monthly 14 river sites and 14 creek sites.

The project's aim is therefore to assess the compliance of the river and creeks with DES guidelines in 2019, to identify trends, and to recommend further actions to enhance water quality in the Noosa River.

DATA INVESTIGATED

The properties measured are Temperature, pH (acidity), Conductivity, Turbidity, Dissolved Oxygen, Salinity, and Total Dissolved Solids as recorded by Horiba test instruments maintained by NICA. These properties are taken as proxies for other elements of stream health such as counts of macroinvertebrates, nutrients, bacteria, etc. Suez Group, operators of the Noosa Water treatment Facility, have supported NICA by regularly providing chemical testing for phosphate and nitrate content.

LIMITATIONS ON DATA

Parts of this analysis cannot be regarded as very rigorous for a number of reasons:

(i) Older data, especially prior to 2015, is very incomplete: some parameters are missing, and records have been intermittent for many months

(ii) Dissolved oxygen has previously been recorded as concentration in mgm/l, whereas DES guidelines require temperature and salinity corrected % saturation. However incomplete recording of both these parameters over time means long term comparisons of DO are limited.

(iii) The Horiba instruments have questionable reproducibility. In series of tests on the same sample, rogue measurements are occasionally observed. It is unknown whether such rogue results have been recorded, or whether older tests have been repeated and more consistent figures retained.

(iv) It is unknown whether single observations for older measurements have been retained or whether average results were determined and recorded. The former may include erroneous entries. Since March 2018 all results are averages of at least two measurements which appear reasonably consistent.

(v) Despite the regular calibration of the Horiba instruments we are aware that some older tests are just plain wrong, especially for Turbidity when the instrument has occasionally produced irrational figures. Such results may have been included in our analysis.

(vi) Many monthly measurement have, in the past, been made near high tide to permit access to some sites. In retrospect this was wrong, as the water then is mostly incoming clean sea water, rather than outflowing river water containing any potential pollutants flowing down from upstream. All recent measurements are now restricted to times late in an ebbing tide

(vii) Due to intermittence of many records, seasonal variations may inadvertently sway some conclusions. Typically, temperatures vary between 16 and over 30° which can affect stream flow and hence turbidity and oxygen demand.

As a result, we only regard data recorded since March 2018 as being complete and of sufficient validity to deliver rigorous comparisons.

OBSERVATIONS & ANALYSIS

Older data from Envirocoms and post-2015 data held by the author have been transferred to an Excel spreadsheet to facilitate statistical assessment and comparisons. Envirocoms does not accommodate any analysis of results.

In accordance with DES WQO guidelines 80th percentiles have been calculated to compare the 2018/19 data with those from the long term medians. The results are in the Appendix, in separate tables for the main river sites and the tributary creek sites. Incomplete recording over earlier times means long term comparisons of Dissolved Oxygen in particular are limited.

A problem with 80th percentiles is the statistical inaccuracy arising from fewer than about 20 data items. Thus a 12 month period yields insufficient data for rigorous statistical comparisons. By late 2020 there should be sufficient data to overcome this limitation.

COMPARISON OF MEASUREMENTS

MAIN RIVER SITES

Test sites in the main river are generally well compliant with the WQO guidelines. Where discrepancies are evident the latest data have trended closer compared with the long term medians.

pH values are compliant throughout the river. Turbidity at some sites exceeds expectations, at Lake Doonella, Makepeace Island, and Wooroi Creek mouth, which are all immediately downstream of well populated areas. Median turbidities appear high for Tronsons Canal, and the lakes Coroibah, and Cootharaba, but there is suspicion that these are skewed by incorrect figures in earlier measurements. The only site where DO is low is Tronsons Canal, where tannin stained discharges are frequently observed caused by decaying vegetation causing consequent loss of oxygen from the water.

TRIBUTARY CREEK SITES

pH values are compliant throughout except at the uppermost sites of Noosa River, Wooroi and Eenie Creeks, where they exit from forests. The slightly lower values could be attributable to tannin content. Turbidity is high in all the tributaries except the upper Noosa River above Lake Como and in Murdering Creek, both of which are solely draining from pristine Wallum plains. All the creeks except for the upper river show oxygen depletion, Eenie and Murdering Creeks having the lowest DO. Murdering Creek has a high tannin content, while Eenie Creek carries discharge from a housing area followed by the industrial area. The streams do recover some oxygen as they progress downstream.

RAIN EVENTS

The current period has had climate variations with extended drought between June 2018 and March 2019, and up to 450 mm falling in following weeks. The smaller creeks dried completely and flow was very slow in the main river. Significant variations are evident after heavy rain events particularly in conductivity due to dilution of salinity in the water. pH was lower after heavy rain, by an average of 1 pH unit in the river, but only 0.3 units in the creeks. This is expected as rainwater is weakly acidic due to its equilibration with carbon dioxide in the air. Turbidity normally increases a few weeks after significant rain as groundwater percolates to the streams and carries suspended solids with it. Dissolved oxygen also increases as the fresh rainwater becomes saturated with oxygen as it falls. In general measurements tend back towards their previous values after some two months.

CHEMICAL POLLUTANTS

Limited chemical testing for phosphates and nitrates commenced this year, and at most three tests have now been done on selected sites. The following summary must be regarded as indicative only.

Phosphate P concentrations of 30 µgm/L and more have been reported, which is about twice the recommended Guidelines. This requires further confirmation and investigation.

Nitrate N concentrations are very low and well below the Guidelines at all sites.

RECOMMENDATIONS

Turbidity in all the tributary creeks is higher than recommended with the exception of Murdering Creek and the upper Noosa River. This solid content is more apparent in the creeks than in the river where it becomes diluted, so should be used as the indicator of need for action to reduce erosion of the banks. The creeks leading from well populated areas should be considered for possible remediation programs.

Low Dissolved Oxygen levels in the more populated creeks are indicators of pollution as these receive all stormwater discharges from homes, roads, and industries. There may be options to enable stormwater to be treated via bioretention basins, particularly in new property developments. A wider testing schedule of stormwater drain outlets should be revived. This work has not been undertaken since 2014, so a program of quarterly testing for 1 – 2 years could be appropriate to determine whether stormwater is a significant source of pollution and what remedial work should be undertaken.

Monitoring closer to likely sources of pollution in smaller flowing streams has proven to be a more sensitive management tool. This is clearly evident in the readings from Eenie, Cranks and Wooroi creeks.

CONCLUSION

It may be concluded that the Noosa River is in quite good condition and near compliant with the lowest level of compliance (80^{th} percentile) of the DES water quality guidelines. The warning signs from the data for the tributary creeks draining from populated areas indicate that ongoing monitoring and greater control of those streams would be prudent. These would require measures to either reduce pollutants at their sources or to reduce their effects before reaching the river. A testing schedule of stormwater drain outlets should be revived.

FUTURE WATERWATCH

The conclusion to be drawn from this analysis is that a continued Waterwatch program is necessary to maintain and improve the water quality of the Noosa River. Within the next 12 months sufficient data will be generated to achieve reliable statistical evaluations of water quality parameters.

A priority project remaining is to implement appropriate internet storage of the accumulated data so that it becomes available to all potential users.

ACKNOWLEDGEMENTS

NICA thank the following for their support for the work presented:
Noosa Shire Council – for operational financial support
Suez Group - operators of the Noosa Water treatment Facility, for providing chemical testing services for phosphate and nitrate content.
Noosa & District Landcare – for assistance with testing and for chemical supplies
NICA volunteers – who perform the tasks involved in carrying out the test schedule.

REFERENCE

1. Queensland Dept. of Environment and Science, Queensland Water Quality Guidelines Consultation Draft, July 2018.

APPENDIX SUMMARY OF SITE DATA

NOOSA RIVER SITES

NOTE: Data not compliant with WQO Guidelines are highlighted

SITE		Temp °C	pH	Turbidity NTU	DO %	Salinity ppt	Phosphate P µgm/L	Nitrate N µgm/L
KIN997 Kinaba	6/18 - 6/19	23.4	7.93	4.6	99.0	9.1		
	Long term	26.0	7.27	9.9		9.1		
	Guidelines		7.5 - 8.2	5 - 30	85 - 105		< 20	< 640
COT200 Boreen Point	6/18 - 6/19	23.9	8.26	27.3	105.2	12.6		
	Long term	26.9	7.9	52.0		11.3		
	Guidelines		7.5 - 8.2	5 - 30	85 - 105		< 20	< 640
NOO401 Tronsons Canal Upstream	6/18 - 6/19	26.0	7.77	19.2	84.7	13.8	100	0
	Long term	26.0	7.77	19.2				
	Guidelines		7.5 - 8.2	8 - 19	85 - 105		< 17	< 498
NOO400 Tronsons Canal Downstream	6/18 - 6/19	23.8	7.52	18.4	71.1	12.0	100	0
	Long term	25.8	7.8	27.0		16.3		
	Guidelines		7.5 - 8.2	8 - 19	85 - 105		< 17	< 498
CBH010 Lake	6/18 - 6/19	29.2	8.08	10.8	89.2	27.7	< 100	200 - 400

Coroibah								
mid lake	Long term	30.0	8.07	14.3	89.1	26.5		
	Guidelines		8.0 - 8.3	7 - 17	85 - 105		< 17	< 420
CBH050 Lake Coroibah	6/18 - 6/19	29.4	8.24	20.3	118.5	27.0		
lake edge	Long term	28.6	8.11	50.4	113.8			
	Guidelines		8.0 - 8.3	7 - 17	85 - 105		< 17	< 420
WOO980 Wooroi Creek	6/18 - 6/19	25.2	7.94	11.1	82.5	22.8	100	100 - 300
	Long term	26.9	8.00	23.3		19.0		
	Guidelines		8.0 - 8.3	3 - 7	85 - 105		< 15	< 300
NOO500 Makepeace Isl.	6/18 - 6/19	25.4	8.35	15.0	90.8	25.3	100	300 - 500
	Long term	27.6	8.13	25.0		28.0		
	Guidelines		8.0 - 8.3	3 - 7	85 - 105		< 15	< 300
NOO650 Lake Doonella	6/18 - 6/19	26.0	8.28	10.6	89.9	28.0	< 100	200 - 400
	Long term	27.0	8.18	20.0		30.4		
	Guidelines		8.0 - 8.4	1 - 4	90 - 105		< 13	< 210
NOO780 Noosa Canal Input at waterfall	6/18 - 6/19	22.2	7.95	0.8	97.2	22.3	< 100	300 - 500
	Long term	23.6	7.92	1.2				
	Guidelines		8.0 - 8.4	1 - 4	90 - 105		< 13	< 210
NOO070 Noosa Canal	6/18 - 6/19	24.6	8.34	3.0	95.0	30.5	< 100	400

Discharge at lock	Long term	27.3	8.19	12.0		30.9		
	Guidelines		8.0 - 8.4	1 - 4	90 - 105		< 1	< 220
WEY900 Weyba Creek	6/18 - 6/19	25.5	8.25	2.6	87.2	30.8	< 100	500
Keyser Island	Long term	27.3	8.19	10.0		34.6		
	Guidelines		8.0 - 8.3	2 - 4	85 - 105		<14	<260
NOO820 Munna Point	6/18 - 6/19	21.3	8.05	0.9	88.8	28.6		
	Long term	21.3	8.05	0.9				
	Guidelines		8.0 - 8.4	1 - 4	90 - 105		< 13	< 210

TRIBUTARY CREEK SITES

NOTE: Data not compliant with WQO Guidelines are highlighted

SITE		Temp °C	pH	Conductivity mS/cm	Turbidity NTU	DO %	Salinity ppt	Phosphate P µgm/L	Nitrate N µgm/L
KIN 990 Kin Kin Creek upstream	6/18 - 6/19	24.8	6.99	9.9	7.4	71.1	6.2		
	Long term								
	Guidelines		6.5 - 8.0	0.08 - 0.19	< 5	85 - 110		< 40	< 380
NOO 300 Noosa River above Lake Como	6/18 - 6/19	23.1	5.29	1.03	3.72	84.2	0.34		
	Long term	24.5	5.24	0.94	3.64	82.7			
	Guidelines		6.5 - 8.0	0.08 - 0.19	< 5	85 - 110		< 40	< 380
COO 050 Cooloothin Creek	6/18 - 6/19	22.3	7.31	20.6	8	82.4	9.3		
	Long term	26.6	7.2	26	16.4	78.8	9.3		
	Guidelines		7.5 - 8.2	Estuarine	< 30	85 - 105		< 20	< 640
CBH 020 Coroibah Creek	6/18 - 6/19	28.0	7.92	44.2	18.9	60.2	28.7		
	Long term	28.0	7.67	42.2	24.8	67.3	28.7		
	Guidelines		8.0 - 8.3	Estuarine	< 17	85 - 105		< 17	< 420
WOO 520 Wooroi Creek Cooroy Rd	6/18 - 6/19	18.9	5.44	0.41	23.1	67.9	0.2		
	Long term								
	Guidelines		6.5 - 8	0.08 - 0.21	< 5	85 - 110		< 30	< 480

WOO 550 Wooroi Creek George St	6/18 - 6/19	25.8	6.71	37.5	15.1	51.5	23.8	< 100	0 - 500
	Long term	25.8							
	Guidelines		8.0 - 8.3	Estuarine	< 7	85 - 105		< 15	< 300
CRA 900 Cranks Creek	6/18 - 6/19	28.1	7.48	48.5	15.3	63.8	31.6	< 100	0 - 600
	Long term	28.5	7.63	47.6	28.5	77.6	29.6		
	Guidelines		8.0 - 8.4	Estuarine	< 4	90 - 105		< 13	< 210
EEN 005 Eenie Creek above drains	6/18 - 6/19	21.6	5.46	0.29	6.2	42.8	0.17		
	Long term								
	Guidelines		6.5 - 8	0.08 - 0.21	< 5	85 - 110		< 30	<480
EEN 010 Eenie Creek Small drain Rene St	6/18 - 6/19	28	6.7	19.9	39.5	51.4	12.2	100 - 200	0 - 200
	Long term	25.9	6.9	36.6	30	51.4	5.4		
	Guidelines		6.5 - 8	0.08 - 0.21	< 5	85 - 110		< 30	< 480
EEN015 Between drains Rene St	6/18 - 6/19	27.6	6.5	22.2	19.5	53.3	13.3	100 - 200	0 - 600
	Long term								
	Guidelines		8.0 - 8.3	Estuarine	< 15	85 - 105		< 16	< 440
EEN 020 Large drain Rene St	6/18 - 6/19	28.9	6.84	30.4	12.8	57.2	18.8	100 - 200	0 - 600
	Long term								
	Guidelines		8.0 - 8.3	Estuarine	< 15	85 - 105		< 16	< 440
EEN 030 Eenie Creek W Hay Drive	6/18 - 6/19	28.2	7.37	43.2	4.3	65.5	27.8	100 - 200	0 - 400
	Long term								
	Guidelines		8.0 - 8.3	Estuarine	< 15	85 - 105		< 16	< 440

MUR 060 MURDERING CREEK Clarendon Rd.	6/18 - 6/19	23.7	7.18	43.4	2.4	45.4	28.5		
	Long term	27.3	7.25	42.5	7.4	51.9	26.1		
	Guidelines		6.5 - 8	Estuarine	< 5	85 - 110		< 20	<380
MUR 050 MURDERING CREEK Woodland Rd	6/18 - 6/19	19	6.05	0.30	0.78	41.1	0.2		
	Long term	24.7	5.8	0.28	0.8	40.6	0.2		
	Guidelines		6.5 - 8	0.08 - 0.21	< 5	85 - 110		4 - 30	<480