



Basins, Catchments and Receiving Waters of the Black Ross Water Quality Improvement Plan Area

Chapter 9 Bohle River Sub Basin

November 2009



Acknowledgements

This publication was funded by the Australian Government's Coastal Catchments Initiative through the Department of Environment, Water, Heritage and the Arts.



Australian Government



Document disclaimer statement



Townsville City Council advises that this publication contains information based on scientific research, knowledge and understanding as well as perceptions and interpretations of the authors. The reader is advised that such information may be incomplete or unsuitable to be used in certain situations. While all care has been taken in the preparation of this document, Townsville City Council accepts no liability for any decisions or actions taken on the basis of the information contained in this document, or from conclusions drawn from interpreting the information. Readers should be aware that some information might be superseded with further scientific studies and evolving technology and industry practices.

This document can be cited as:

Gunn, J., and Manning, C. 2009, *Basins, Catchments and Receiving Waters of the Black Ross Water Quality Improvement Plan Area (Chapter 9)*, Townsville City Council - Creek to Coral, Townsville.

Contents

<i>Section</i>	<i>Page</i>
9. Bohle River Sub Basin	1
9.1 Bohle River Sub Basin Land Use	2
9.2 Bohle River Sub Basin Demographics	4
9.3 Bohle River Sub Basin Land Use by Catchments	6
9.4 Bohle River Sub Basin Resource Condition	8
9.5 Water Quality and Water Quality Objectives (WQOs)	9

Tables	<i>Page</i>
Table 9.1 Bohle River Sub Basin Land Use	4
Table 9.2 Selected Medians and Averages	5
Table 9.3 Count of Occupied Private Dwellings(a) and Persons in Occupied Private Dwellings	5
Table 9.4 Bohle River (lower) Catchment Land Use 1999 and 2005	6
Table 9.5 Bohle River (upper) Catchment Land Use 1999 and 2005.....	6
Table 9.6 Shelly Beach Catchment Land Use 2005.....	7
Table 9.7 Catchments Land Use Summary	7
Table 9.8 Comparing WQOs with Water Quality	9

Figures	<i>Page</i>
Figure 9.1 Bohle River Sub Basin and Drainage.....	1
Figure 9.2 Bohle River Sub Basin Imagery	2
Figure 9.3 Bohle River Sub Basin Land Use	3
Figure 9.4 Bohle River Sub Basin Ecological Impact	8

Document Control						
						Document ID:
Rev No	Date	Revision Details	Typist	Author	Verifier	Approver
14	May 2010	Final revision	JG	JG	CM/GB	C2C

The previous chapters

- 1. Introduction**
- 2. Black Ross Receiving Waters**
- 3. WQIP Area Overview**
- 4. Basins, Sub Basins and Catchments**
- 5. Crystal Creek Sub Basin**
- 6. Rollingstone Creek Sub Basin**
- 7. Bluewater Creek Sub Basin**
- 8. Black River Sub Basin**

Av
Fl
Nu
Pr
Pr

9. Bohle River Sub Basin

The Bohle River Sub Basin is dominated by the Bohle River with the relatively small Shelly Beach catchment located in the northeast corner of the sub basin. There are also a number of smaller waterways in the sub basin however most of the waterways are tributaries of the Bohle River including the Little Bohle River, Louisa Creek, Saunders Creek and Stoney Creek (see Figure 9.1 and Figure 9.2).

Figure 9.1 Bohle River Sub Basin and Drainage

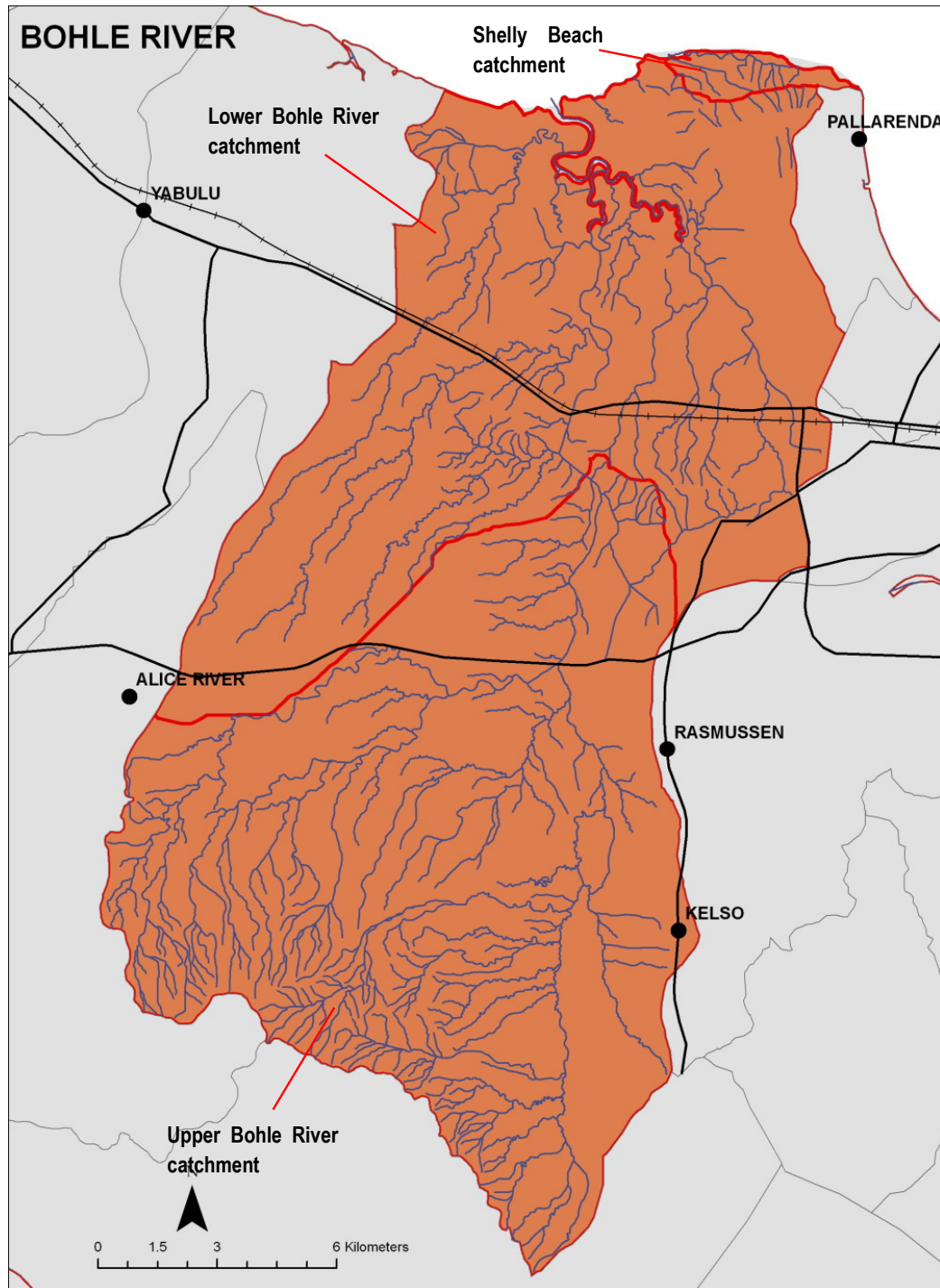


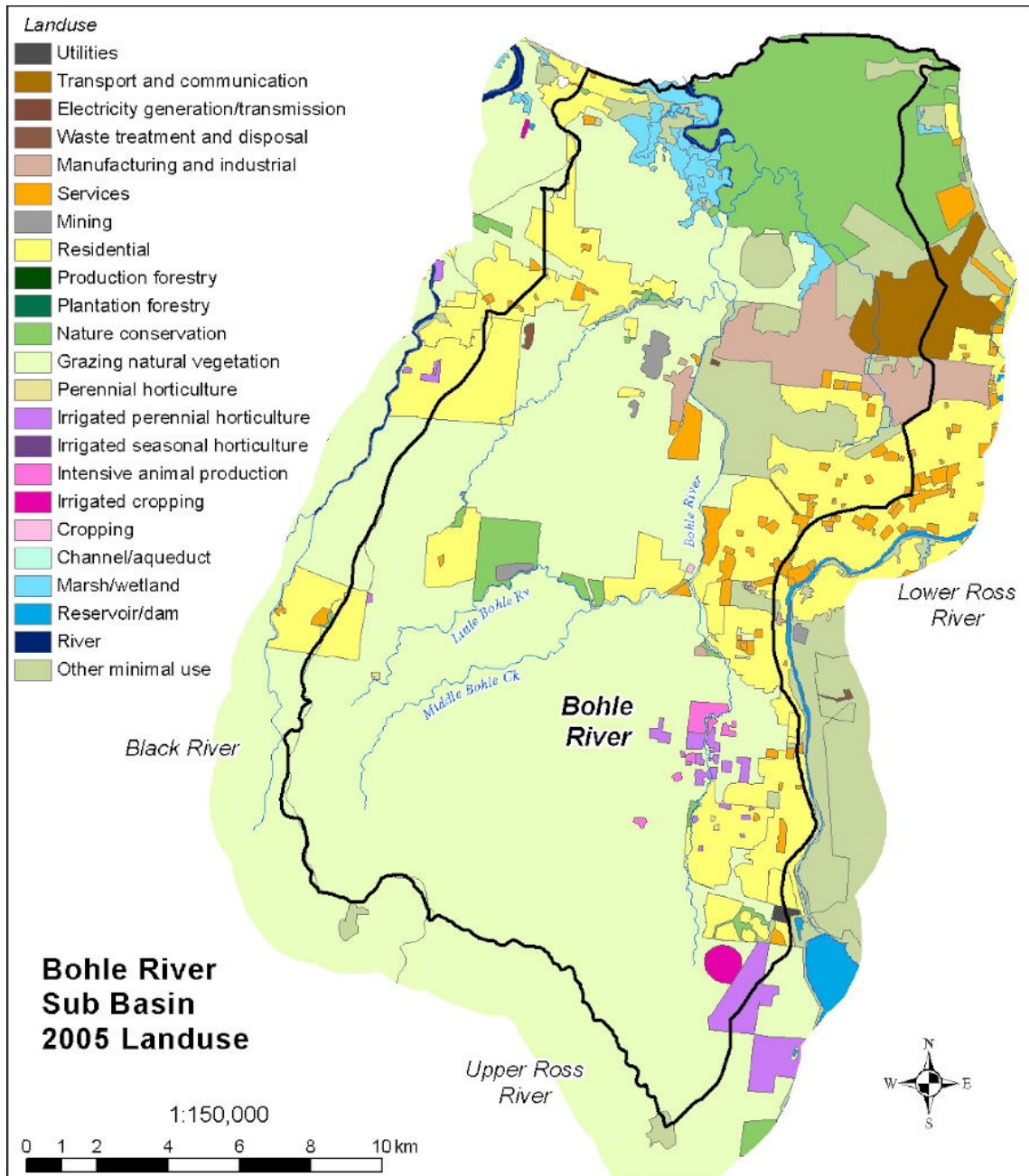
Figure 9.2 Bohle River Sub Basin Imagery



9.1 Bohle River Sub Basin Land Use

The Bohle River Sub Basin is approximately 322 square kilometres in size (~32,200 hectares). Land use in the Bohle River Sub Basin is dominated by grazing (59%). Combined nature conservation and other minimal use (16%) occupies a significant area of the sub basin while residential and associated urban land uses dominate a number of Bohle River tributary catchments and account for over 20% of the total sub basin land area (see Figure 9.3 and Table 9.1).

Figure 9.3 Bohle River Sub Basin Land Use



Source: 2005 land use update generated by Connell Wagner using QLUMP 1999 data (DNRW), 2005 aerial photography (Townsville City Council) and SPOT imagery (NQ Dry Tropics).

Table 9.1 Bohle River Sub Basin Land Use

Land Use	QLUMP 1999		2005 Update	
	Area (ha)	Area (%)	Area (ha)	Area (%)
Cropping	4	<0.1	4.3	<0.1
Grazing natural vegetation	19,965	62	19,019	59
Intensive animal production	90	0.3	101	0.3
Irrigated cropping			88	0.3
Irrigated perennial agriculture	254	0.8	299	0.9
Manufacturing and industrial	837	2.6	1,007	3.1
Marsh/Wetland	529	1.6	514	1.6
Mining	95	0.3	110	0.3
Nature conservation	3,185	9.9	3,197	9.9
Other minimal use	2,115	6.6	2,053	6.4
Perennial horticulture	27	<0.1	10	<0.1
Reservoir/Dam	3	<0.1	3	<0.1
Residential	3,944	12.24	4,755	14.8
River	16	<0.1	16	<0.1
Services	694	2.22	532	1.7
Transport and communication	443	1.4	485	1.5
Utilities	17	<0.1	21	<0.1
Waste treatment and disposal	12	<0.1	17	<0.1
	32,230	100	32,229	100

Source: QLUMP 1999 calculations from CSIRO and 2005 update figures generated by Connell Wagner using QLUMP 1999 data (DNRW), 2005 aerial photography (Townsville City Council) and SPOT imagery (NQ Dry Tropics). Figures have been rounded to the nearest hectare.

9.2 Bohle River Sub Basin Demographics

The 2006 Census counted 62,026 people resident within the Bohle River Sub Basin. The sub basin stretches from the Pinnacles to the coast and includes the bulk of the Bushland Beach suburb, plus established residential areas below the Ross River Dam, and Townsville's northwestern suburbs including Mount Louisa, Heatley and Kirwan. Selected medians and averages for the Bohle River Sub Basin from the 2006 Census are provided in Table 9.2

Significant areas of the sub basin are earmarked for residential development in the near future i.e. one to 10 years, including the planned new suburb of Cosgrove, the proposed 'Greater Ascot' development in the Shaw's Road vicinity, Stockland's North Shore development at Burdell, Devine residential estate at Dunlop Street Kelso, and Kalynda Chase.

The lower reaches of the sub basin are dominated by industrial and commercial use including Defence lands and the Townsville Airport and RAAF base.

Housing in the Bohle Sub Basin consists predominantly of single family dwellings with 18,355 dwellings being separate houses out of a total 20,143 dwellings in the area (see Table 9.3).

The median age of the Bohle River Sub Basin population at the 2006 Census was 31 years. Family characteristics vary throughout the sub basin, with a higher proportion of couples with children living in suburban areas, including in the Upper Ross and Bushland Beach areas. Almost 15% of total households in the sub basin report only one person usually resident. This may reflect the presence of retirement style housing and unit development in particular areas.

The average household size of the Bohle River Sub Basin, at 3.1 people per household, is above the average occupancy rate of 2.8 people for the Townsville local government area.

Table 9.2 Selected Medians and Averages 1

Description	Bohle River	Townsville
Median age of persons	31	33
Median individual income (\$/weekly)	532	531
Median family income (\$/weekly)	1,227	1,237
Median household income (\$/weekly)	1,152	1,101
Median housing loan repayment (\$/monthly)	1,246	1,231
Median rent (\$/weekly)	198	190
Average household size	3.1	2.8

Source: ABS 2006 Census of Population and Housing

Notes: Figures are based on place of usual residence. Bohle River is the Bohle River Customised Region and Townsville is Townsville City Council local government area.

Table 9.3 Count of Occupied Private Dwellings(a) and Persons in Occupied Private Dwellings

Dwelling Type	Dwellings		Resident Persons	
	Count	%	Count	%
Separate house	18,355		57,771	
Semi-detached, row or terrace house, townhouse etc:				
One storey	713		1,429	
Two or more storeys	46		90	
Semi-detached, etc Total	759		1,519	
Flat, unit or apartment:				
In one or two storey block	855		1,629	
In a three storey block	3		7	
In a four or more storey block	7		17	
Attached to a house	3		17	
Flat, unit or apartment Total	868		1,670	
Other dwelling:				
Caravan, cabin, houseboat	138		230	
Improvised home, tent, sleepers out	9		22	
House or flat attached to a shop, office, etc.	14		24	
Other dwelling Total	161		276	
Totals	20,143		58,236	

Source: ABS 2006 Census of Population and Housing

Notes: (a) Excludes 'Visitors only' and 'Other not classifiable' households. Figures are for the Bohle River Customised Region.

¹ **Median calculations - PLEASE NOTE** - For this customised Basic Community Profile, medians have been calculated from confidentialised and pertebated Census data. Medians have been calculated based on the assumption of a uniform distribution between ranges. Care should be taken when using these figures.

Median age of persons excludes overseas visitors.

Median individual income is applicable to persons aged 15 years and over.

Median household income is applicable to occupied private dwellings. It excludes households where at least one member aged 15 years and over did not state an income and households.

Median housing loan repayment is applicable to occupied private dwellings being purchased and includes dwellings being purchased under a rent/buy scheme. It excludes 'Visitors only' and 'Other not classifiable' households.

Median rent is applicable to occupied private dwellings being rented. It excludes 'Visitors only' and 'Other not classifiable' households.

Average number of persons per bedroom is applicable to occupied private dwellings. It excludes 'Visitors only' and 'Other not classifiable' households

9.3 Bohle River Sub Basin Land Use by Catchments

Land use summaries of the main catchments of the Bohle River Sub Basin are provided below. Where the 1999 and 2005 land use information is unchanged only the 2005 land use is provided. Additional catchment profile information, kindly provided by DERM/EPA Townsville, is included in Appendix E.

9.3.1 5-1 Lower Bohle River

The lower Bohle River catchment is approximately 14,580 hectares (~146 square kilometres) in area with the main land use being grazing in native pasture (38%). Urban land uses account for approximately 29% of the catchment with nature conservation and minimal use occupying a similar percentage of the catchment land area.

Table 9.4 Bohle River (Lower) Catchment Land Use 1999 and 2005

Secondary Land Use - Tertiary Land Use		QLUMP 1999		2005 Update	
		Area (ha)	%	Area (ha)	%
Nature conservation	Natural feature protection	2,437	16.7	2,451	16.8
	Other conserved area	247	1.7	255	1.8
Other minimal use		1,452	10.0	1,478	8.8
	Defence			189	1.3
	Remnant native cover	166	1.1	144	1.0
Grazing natural vegetation		5,979	41.0	5,529	37.9
Perennial horticulture		2	<0.1	2	<0.1
Irrigated perennial horticulture		3	<0.1	4	<0.1
Manufacturing and industrial		823	5.6	990	6.8
Residential		1,543	10.6	1,922	13.2
	Rural residential	455	3.1	455	3.1
Services		77	0.5	79	0.5
	Commercial services	195	1.3	29	0.2
	Recreation and culture	131	0.9	131	0.9
Utilities - Electricity generation/transmission				4	<0.1
Transport and communication	Airports/aerodromes	437	3.0	478	3.3
	Railways	1	<0.1	14	<0.1
Mining		77	0.5	82	0.6
Waste treatment and disposal - Landfill		12	0.1	17	0.1
Reservoir/dam		3	<0.1	3	<0.1
River		16	0.1	16	0.1
Marsh/wetland		290	2.0	275	1.2
	Marsh/W Conservation	239	1.6	239	1.6
Total		14,583		14,583	

Source: QLUMP 1999 calculations from CSIRO and 2005 update figures generated by Connell Wagner using QLUMP 1999 data (DNRW), 2005 aerial photography (Townsville City Council) and SPOT imagery (NQ Dry Tropics). Figures have been rounded to the nearest hectare.

9.3.2 5-2 Upper Bohle River

The upper Bohle River catchment is approximately 17,280 hectares (~173 square kilometres) in area and is dominated by grazing (78%). Urban land uses occupy approximately 16% of the catchment.

Table 9.5 Bohle River (upper) Catchment Land Use 1999 and 2005

Secondary Land Use - Tertiary Land Use		QLUMP 1999		2005 Update	
		Area (ha)	%	Area (ha)	%
Nature conservation	Other conserved area	178	1.0	168	1.0
Other minimal use		448	2.6	382	2.2
	Remnant native cover	15	<0.1	15	<0.1
Grazing natural vegetation		13,987	80.9	13,489	78.0

Cropping		4	0.0	4	<0.1
Perennial horticulture		25	0.1	8	<0.1
Irrigated perennial horticulture		103	0.6	88	0.5
	Irrigated tree fruits	139	0.8	125	0.7
	Irrigated tree nuts	9	<0.1	171	1.0
Intensive animal production	Poultry	10	<0.1	12	<0.1
	Aquaculture	81	0.5	88	0.5
Manufacturing and industrial		15	0.1	17	0.1
Residential		1,348	7.8	1,643	9.5
	Rural residential	599	3.5	734	4.3
Services		77	0.4	78	0.5
	Commercial services	24	0.1	24	0.1
	Recreation and culture	191	1.1	191	1.1
Utilities - Electricity generation/transmission		17	0.1	17	0.1
Transport and communication - Railways		6	<0.1	6	<0.1
Mining		18	0.1	28	0.2
	Total	17,291		17,289	

Source: QLUMP 1999 calculations from CSIRO and 2005 update figures generated by Connell Wagner using QLUMP 1999 data (DNRW), 2005 aerial photography (Townsville City Council) and SPOT imagery (NQ Dry Tropics). Figures have been rounded to the nearest hectare.

9.3.3 5-3 Shelly Beach

The Shelly Beach catchment is approximately 360 hectares (~4 square kilometres) in area. The catchment is composed entirely of nature conservation and minimal use areas.

Table 9.6 Shelly Beach Catchment Land Use 2005

Primary Land Use	Secondary Land Use	Tertiary Land Use	Area (ha)	%
Conservation and natural environments	Nature conservation	Natural feature protection	323	90.4
	Other minimal use		34	9.6
Total			357	

Source: 2005 land use figures generated by Connell Wagner using QLUMP 1999 data (DNRW), 2005 aerial photography (Townsville City Council) and SPOT imagery (NQ Dry Tropics). Figures have been rounded to the nearest hectare.

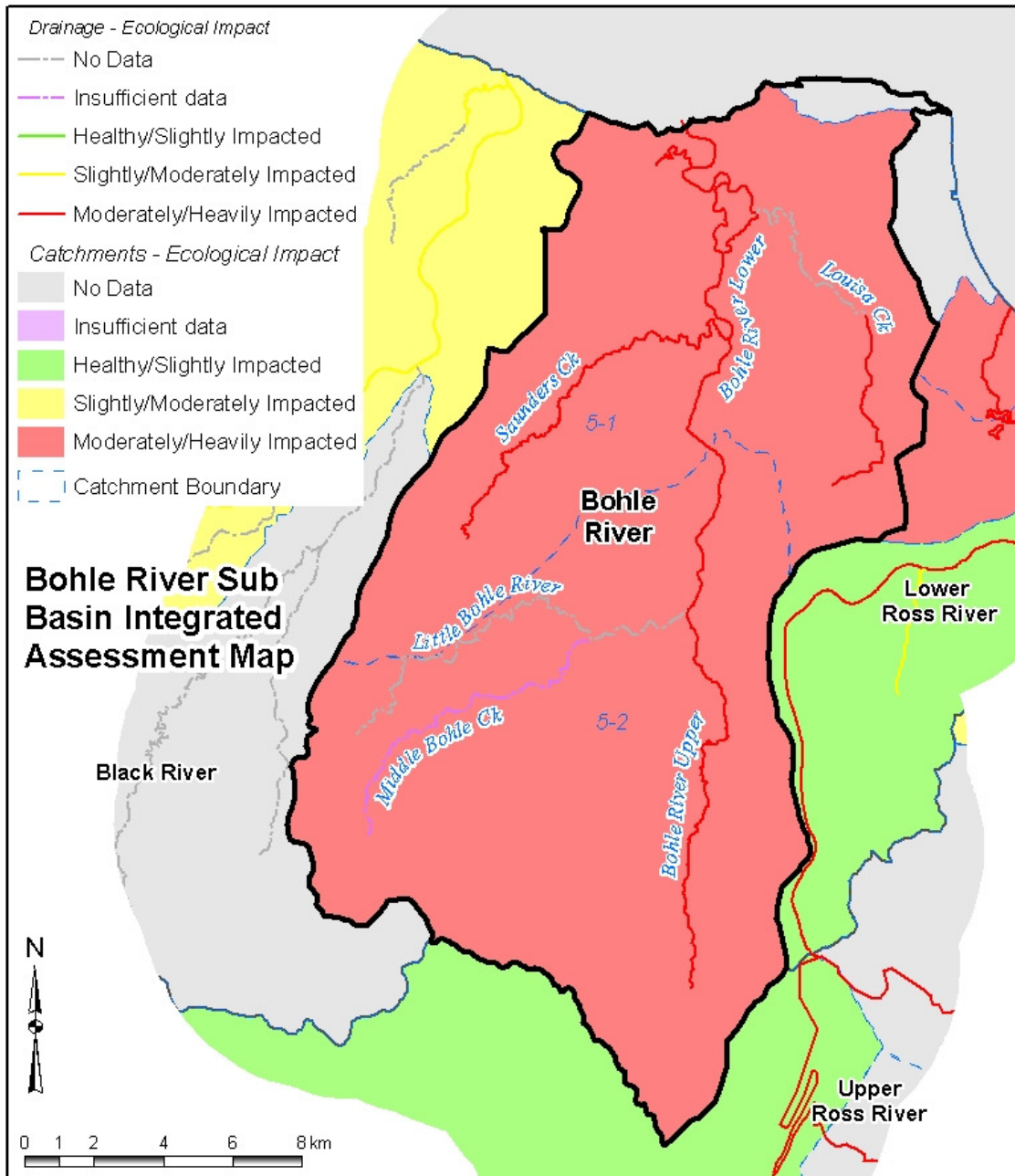
Table 9.7 Catchments Land Use Summary

Land Use	Lower Bohle River (5-1)		Upper Bohle River (5-2)		Shelly Beach (5-3)	
	Ha	%	Ha	%	Ha	%
Conservation and natural areas	4,328	29.7	565	3.3	357	100.0
Grazing	5,529	37.9	13,489	78.0	0	
Rural residential	455	3.1	734	4.2	0	
Intensive agriculture	6	0.0	396	2.3	0	
Urban	3,733	25.6	2,105	12.2	0	
Water and wetlands	532	3.6	0		0	
Totals	14,583		17,289		357	

9.4 Bohle River Sub Basin Resource Condition

The Black Ross WQIP area water quality condition assessment (Connell Wagner 2008) indicated that the water quality of the Bohle River sub basin was heavily impacted (see Figure 9.4).

Figure 9.4 Bohle River Sub Basin Ecological Impact



(Note: Water quality data was assessed against water quality objectives (WQOs) derived from the Queensland Water Quality Guidelines (EPA 2006) for the Central Coast region for lowland streams)

Data indicates that nutrients, in particular filterable reactive (dissolved inorganic) phosphorus (FRP) is at very high levels. This trend is consistent across all of the lowland stream reaches where monitoring occurred while phosphorus levels were much lower in the mid-estuarine reaches.

Recent data for water clarity and pH confirm this assessment however there is no recent data for nutrients in this sub basin.

9.5 Water Quality and Water Quality Objectives (WQOs)

When we compare water quality condition data with the WQOs for the Bohle River sub basin we are confronted with the most degraded waterways in the Black Ross WQIP area. The only WQO that is met in the Bohle River is dissolved inorganic nitrogen (DIN) (below the Bruce Highway) (see Table 9.8).

Soluble forms of nutrients are particularly high in the middle and lower freshwater reaches of the Bohle River, suggesting a significant impact associated with the discharge from the wastewater treatment plants in the sub basin.

Table 9.8 Comparing WQOs with Water Quality

Bohle River Sub Basin	DIN	Org N	TN	FRP	TP	TSS
Bohle R (below H'way) 5-1	√* 14%	X 16%	X 24%	X 330%	X 160%	X 110%
Bohle R (above H'way) 5-2	X 1,064%	X 138%	X 264%	X 19,900%	X 4,900%	X 140%

Notes: Tick/cross denotes if the WQO is met (√) or not (X) for the waterway based on the median value for the water quality indicator. The percentage indicates the amount by which the WQO is met or not met (the difference between the WQO and water quality condition median as a percentage of the WQO). No % is listed if the water quality condition is the same as the WQO. ND is no data.

DIN is dissolved inorganic nitrogen, Org N is organic nitrogen, TN is total nitrogen, FRP is filterable reactive phosphorus, TP is total phosphorus and TSS is total suspended solids (sediment).

* indicates inconsistency or a wide variation in the data, or insufficient data to calculate percentiles.

¹ indicates data is dated and may not reflect current condition.

[More information about water quality conditions and WQOs can be found in; *Environmental Values, Water Quality Objectives and Targets for the Black Ross Water Quality Improvement Plan* (Gunn, Manning, and McHarg 2009), and *Water Quality Condition of the Black and Ross River Basins* (Connell Wagner 2008)]