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

Chapter 7
Bluewater Creek Sub Basin

November 2009

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Contents

Tables

Figures

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The previous chapters

7. Bluewater Creek Sub Basin

The Bluewater Creek Sub Basin includes the Sleeper Log Creek, Two Mile Creek, Bluewater Creek and Deep Creek catchments. There are also a number of smaller waterways that have been included in the catchments of these larger creeks (see Figure 7.1 and Figure 7.2).

Figure 7.1 Bluewater Creek Sub Basin and Drainage

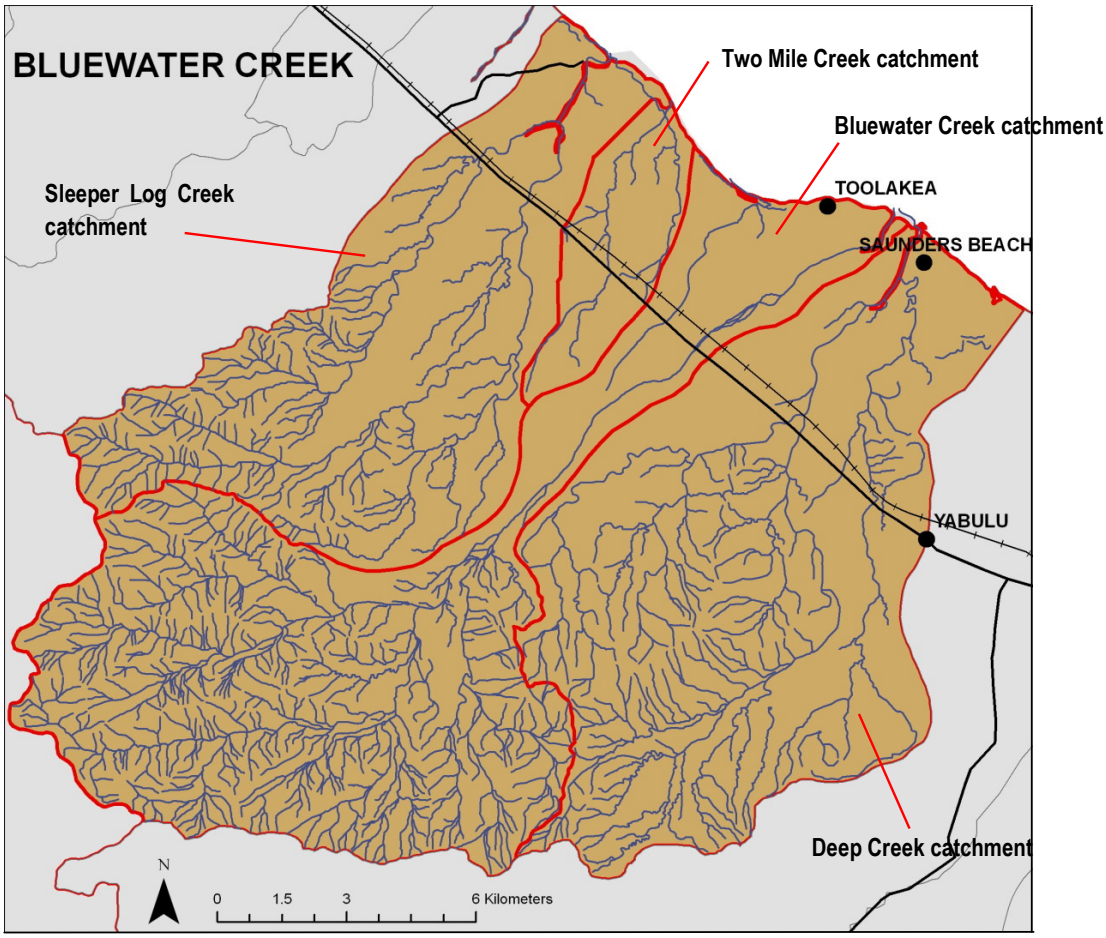
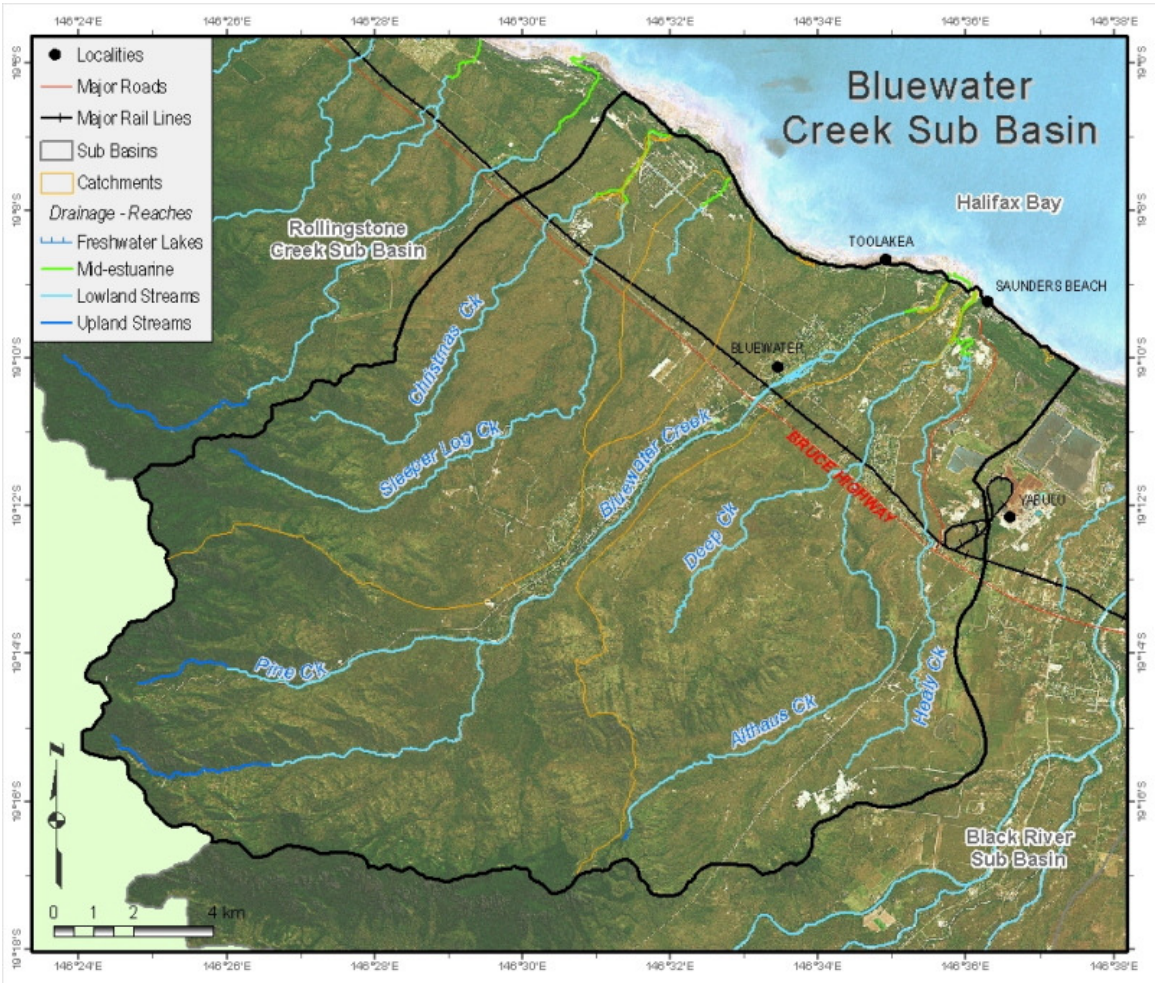


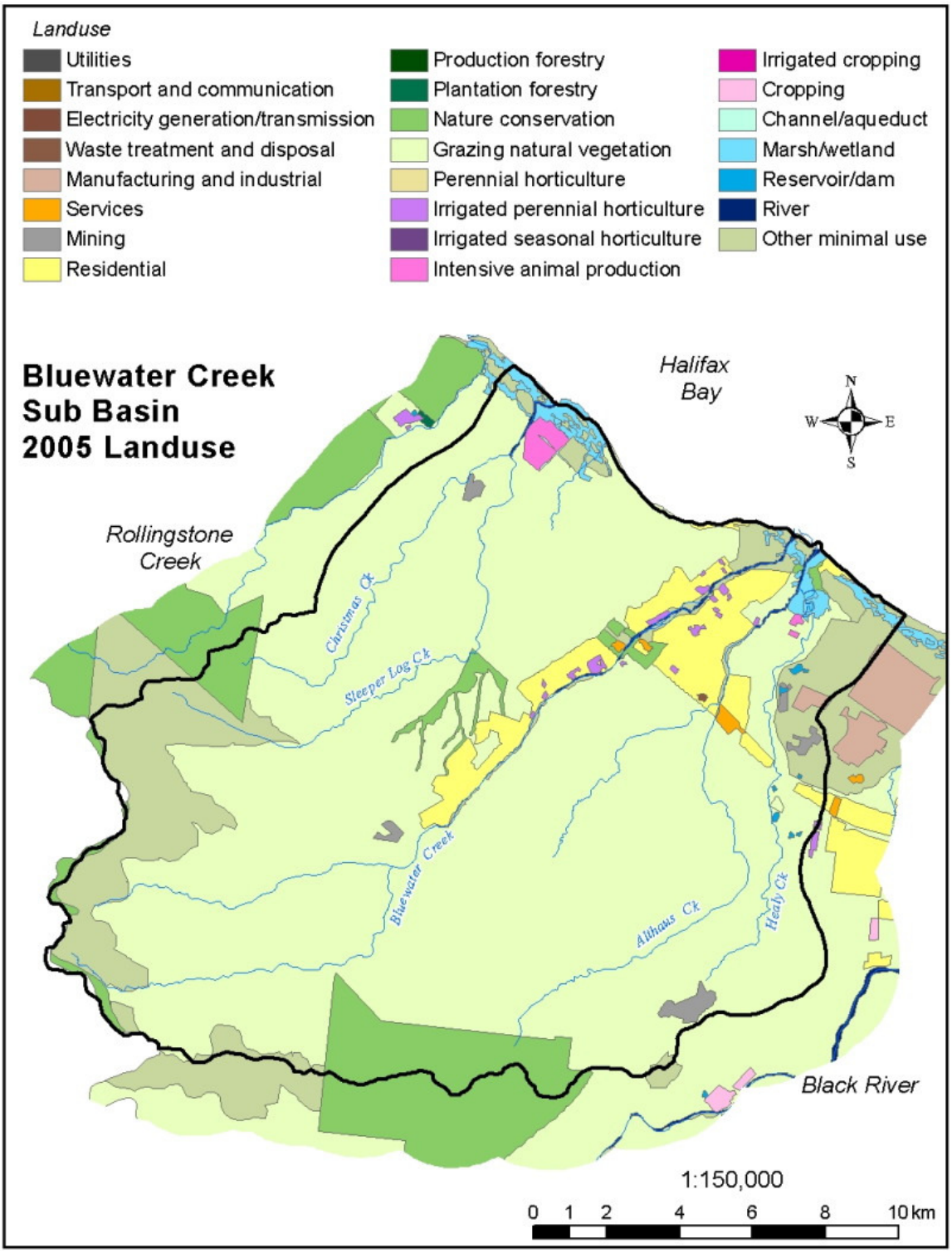
Figure 7.2 Bluewater Creek Sub Basin Imagery



7.1 Bluewater Creek Sub Basin Land Use

The Bluewater Creek Sub Basin is approximately 290 square kilometres in size (~29,000 hectares). Land use in the Bluewater Creek Sub Basin is dominated by grazing (75%). Nature conservation and other minimal use (17%) is the next most prolific land use followed by residential (5%) (see Figure 7.3 and Table 7.1).

Figure 7.3 Bluewater Creek 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 7.1 Bluewater Creek Sub Basin Land Use

Land Use	QLUMP 1999		2005 Update	
	Area (ha)	Area (%)	Area (ha)	Area (%)
Channel/Aqueduct	7	<0.1	7	<0.1
Grazing natural vegetation	21,912	75.3	21,893	75.4
Intensive animal prod./Aquaculture	105	0.4	117	0.4
Irrigated perennial agriculture	77	0.3	77	0.3
Manufacturing and industrial	0	0	48	0.2
Marsh/Wetland	352	1.2	341	1.2
Mining	169	0.6	177	0.6
Nature conservation	1,682	5.8	1,645	5.7
Other minimal use	3,185	11	3,133	10.8
Reservoir/Dam	27	<0.1	20	<0.1
Residential	1,473	5.1	1,473	5.1
River	58	0.2	58	0.2
Services	45	0.2	45	0.2
Waste treatment and disposal	4	<0.1	4	<0.1
Total	29,096	100	29,037	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.

7.2 Bluewater Creek Sub Basin Demographics

The 2006 Census counted 2,876 people resident within the Bluewater Creek Sub Basin area, which includes beachside settlements, rural residential development and parts of the Queensland Nickel Industry Yabulu manufacturing and refining plant. Selected medians and averages from the 2006 Census are provided for the Bluewater Creek Sub Basin in Table 7.2

Small urban residential settlement in the basin occurs at Toolakea and Saunders Beach, with significant rural residential style development between Toolakea and Bluewater Park, and at Yabulu. Rural residential development largely adopts a linear pattern taking advantage of existing road infrastructure. This is particularly evident along Forestry Road, which for part of its length runs parallels to Bluewater Creek.

Housing style in the Bluewater Creek Sub Basin is predominantly single-family dwellings with 936 dwellings being separate houses out of a total 1,022 dwellings in the area (see Table 7.3).

The median age of the Bluewater Creek Sub Basin population at 2006 is reported at 38 years. There is a high percentage of couple families without children (41%) with the average household size at 2.8 persons being the same as the average occupancy for the Townsville local government area..1

Very few Bluewater Creek Sub Basin residents reported that they worked from home, with a significant percentage (68%) reporting they travel to work as the driver of a private motor vehicle.2

Despite the Urban Growth Boundaries identified in the Planning Scheme for the City of Thuringowa, including a significant area to the north of Toolakea Beach, the distance from Townsville's established employment and service centres suggests that significant urban residential development is unlikely to occur within the near future, however expanded or intensified rural residential activity may occur.

[1] All Dwelling, Household, and Median data is sourced from the 2006 Census Population and Housing Customised Basic Community Profile

[2] 2006 Census Population and Housing Customised Basic Community Profile (method of travel to work)

Future development related to intensification at the existing refinery and nickel processing site may occur within the Bluewater Sub Basin, despite production cut backs in 2008/2009, resulting from the economic downturn.

Table 7.2 Selected Medians and Averages [3]

Description	Bluewater Creek	Townsville
Median age of persons	38	33
Median individual income ($/weekly)	502	531
Median family income ($/weekly)	1,156	1,237
Median household income ($/weekly)	1,086	1,101
Median housing loan repayment ($/monthly)	1,195	1,231
Median rent ($/weekly)	195	190
Average household size	2.8	2.8

Source: ABS 2006 Census of Population and Housing

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

Table 7.3 Count of Occupied Private Dwellings(a) and Persons in Occupied Private Dwellings

Dwelling Type	Dwellings		Resident Persons	
	Count	%	Count	%
Separate house	936		2,541	
Semi-detached, row or terrace house, townhouse etc:				
One storey	5		0	
Semi-detached, etc Total	5		0	
Flat, unit or apartment:				
In one or two storey block	13		34	
Flat, unit or apartment Total	13		34	
Other dwelling:				
Caravan, cabin, houseboat	57		110	
Improvised home, tent, sleepers out	8		19	
House or flat attached to a shop, office, etc.	0		0	
Other dwelling Total	65		129	
Totals	**1,022**		**2,704**	

Source: ABS 2006 Census of Population and Housing

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

[3] **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

7.3 Bluewater Creek Sub Basin Land Use by Catchment

Land use summaries of the main catchments of the Bluewater Creek 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.

7.3.1 3-1 Sleeper Log Creek

The Sleeper Log Creek catchment is approximately 7,170 hectares in area (~72 square kilometres) with the main land use being grazing in native pasture (77%).

Table 7.4 Sleeper Log Creek Catchment Land Use 2005

Primary Land Use	Secondary Land Use	Tertiary Land Use	Area (ha)	%
Conservation and natural environments	Nature conservation	Natural feature protection	228	3.2
		Other conserved area	132	1.8
	Other minimal use	Remnant native cover	884	12.3
Production from relatively natural environments	Grazing natural vegetation		5,528	77.1
Intensive uses	Intensive animal production	Aquaculture	105	1.5
	Residential	Rural residential	98	1.4
	Mining		33	0.5
Water	River		8	0.1
	Channel/aqueduct		7	0.1
	Marsh/wetland		38	0.5
		Marsh/W Conservation	108	1.5
		Total	7,168	

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.

7.3.2 3-2 Two Mile Creek

The Two Mile Creek catchment is approximately 1,340 hectares in area (~13 square kilometres) with the main land use being grazing in native pasture (92%).

Table 7.5 Two Mile Creek Catchment Land Use 2005

Primary Land Use	Secondary Land Use	Tertiary Land Use	Area (ha)	%
Conservation and natural environments	Nature conservation	Other conserved area	21	1.6
	Other minimal use	Remnant native cover	49	3.7
Production from relatively natural environments	Grazing natural vegetation		1,235	92.3
Water	Channel/aqueduct		1	<0.1
	Marsh/wetland		18	1.3
		Marsh/W Conservation	14	1.1
		Total	1,338	

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.

7.3.3 3-3 Bluewater Creek

The Bluewater Creek catchment is approximately 10,500 hectares in area (~105 square kilometres) with the main land use being grazing in native pasture (68%).

Table 7.6 Bluewater Creek 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	131	1.2	98	0.9
	Other conserved area	848	8.0	848	8.1
Other minimal use		85	0.8	85	0.8
	Remnant native cover	1,381	13.1	1,374	13.1
Grazing natural vegetation		7,189	68.3	7,189	68.5
Irrigated perennial horticulture		2	<0.1	2	<0.1
	Irrigated tree fruits	59	0.6	59	0.6
Residential		23	0.2	23	0.2
	Rural residential	725	6.9	725	6.9
Services		4	<0.1	4	<0.1
	Recreation and culture	7	0.1	7	0.1
Mining		16	0.2	16	0.2
River		43	0.4	43	0.4
Marsh/wetland		4	<0.1	4	<0.1
	Marsh/W Conservation	16	0.2	16	0.2
	Total	10,532		10,492	

Source: QLUMP 1999 calculations from CSIRO and 2005 calculation from land use update 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.

7.3.4 3-4 Deep Creek

The Deep Creek catchment is approximately 10,060 hectares in area (~100 square kilometres) with the main land use being grazing in native pasture (79%).

Table 7.7 Deep Creek 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	323	3.2	323	3.2
Other minimal use		653	6.5	610	6.1
	Remnant native cover	133	1.3	133	1.3
Grazing natural vegetation		7,961	79.2	7,942	79.0
Irrigated perennial horticulture		3	<0.1	2.9	<0.1
	Irrigated tree fruits	13	0.1	13	0.1
Intensive animal production	Aquaculture			12	0.1
Manufacturing and industrial				48	0.5
Residential		150	1.5	150	1.5
	Rural residential	476	4.7	476	4.7
Services		2	<0.1	2	<0.1
	Recreation and culture	31	0.3	32	0.3
Mining		120	1.2	128	1.3
Waste treatment and disposal	Landfill	4	<0.1	4	<0.1
Reservoir/dam		21	0.2	21	0.2
	Reservoir – intensive use	5	0.1		
River		7	0.1	7	0.1
Marsh/wetland		84	0.8	84	0.8
	Marsh/W Conservation	71	0.7	71	0.7
	Total	10,057		10,057	

Source: QLUMP 1999 calculations from CSIRO and 2005 calculation from land use update 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 7.8 Catchments Land Use Summary

Land Use	Sleeper Log Creek (3-1)		Two Mile Creek (3-2)		Bluewater Creek (3-3)		Deep Creek (3-4)	
	Ha	%	Ha	%	Ha	%	Ha	%
Conservation and natural areas	1,244	17.4	71	5.3	2,404	22.9	1,066	10.6
Grazing	5,528	77.1	1,235	92.3	7,189	68.5	7,941	79.0
Rural residential	98	1.4	0		725	6.9	476	4.7
Intensive agriculture	0		0		61	0.6	16	0.2
Urban	138	1.9	0		51	0.5	376	3.7
Water and wetlands	161	2.2	33	2.4	63	0.6	182	1.8
Totals	7,169		1,338		10,492		10,057	

7.4 Bluewater Creek Sub Basin Resource Condition

The Black Ross WQIP area water quality condition assessment (Connell Wagner 2008) indicated that the water quality of this sub basin was generally representative of ecologically healthy lowland stream systems (see Figure 7.4). However, total suspended solids (sediment) (TSS) were found to be generally high for this sub basin while dissolved oxygen was generally low.

More recent data for Bluewater Creek shows that the dissolved oxygen is still low while TSS falls within the guideline limit.

7.5 Water Quality and Water Quality Objectives (WQOs)

When comparing water quality condition data with the WQOs for the Bluewater Creek Sub Bain we can see that the WQOs are met for the majority of the water quality indicators for each of the streams in the sub basin (see Table 7.9).

The exceptions are:

- Three of the four streams do not meet the WQO for total suspended solids (TSS),
- The fourth stream (Bluewater Creek) does not meet the WQO for dissolved inorganic nitrogen (DIN).

Table 7.9 Comparing WQOs with Water Quality

Bluewater Creek Sub Basin	DIN	Org N	TN	FRP	TP	TSS
[1]Sleeper Log Creek 3-1	√ 78%	√ 52%	√ 52%	√ 75%	√ 40%	X 70%
[1]Two Mile Creek 3-2	√ 76%	√ 52%	√ 54%	√ 55%	√ 20%	X 150%
Bluewater Creek 3-3	X 109%	√* 61%	√* 44%	√ 70%	√* 66%	√* 50%
[1]Deep Creek 3-4	√* 50%	√ 29%	√* 26%	ND	√* 60%	X 40%

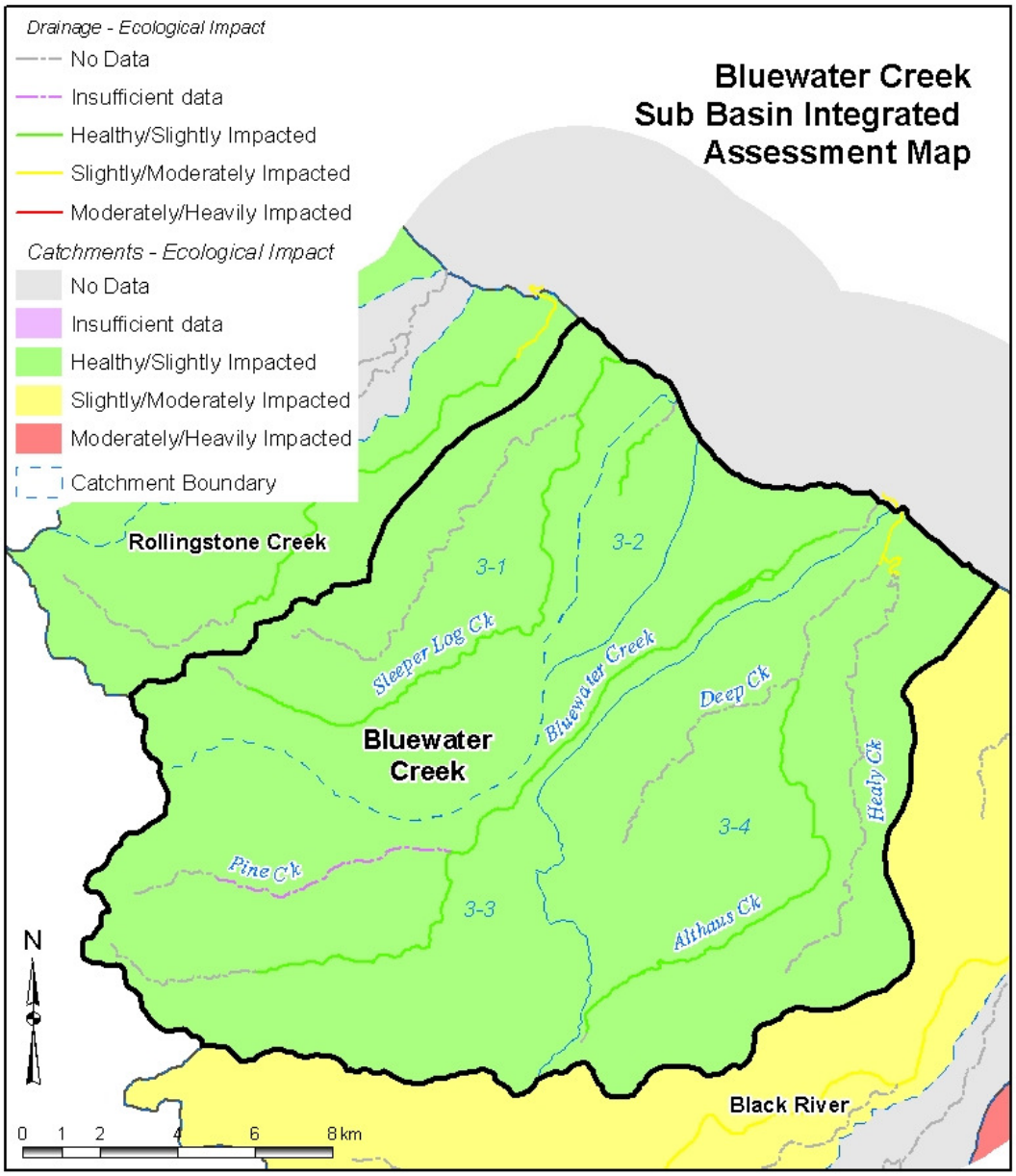
Notes: Tick/cross denotes if the WQO is met (√) or not (X) for the waterway based on the median value for the water quality indicator. The percentage indicates the amount by which the WQO is met or not met (the difference between the WQO and water quality condition median as a percentage of the WQO). 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.

Figure 7.4 Bluewater Creek 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)

[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)]