



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

Chapter 5 Crystal Creek Sub Basin

November 2009



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The previous chapters

- 1. *Introduction***
- 2. *Black Ross Receiving Waters***
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5. Crystal Creek Sub Basin

The Crystal Creek Sub Basin includes Crystal Creek, Lorna Creek, Ollera Creek, Scrubby Creek and Hencamp Creek catchments. There are also a number of smaller waterways that have been included in the catchments of these larger creeks (see Figure 5.1 and Figure 5.2).

Figure 5.1 Crystal Creek Sub Basin and Drainage

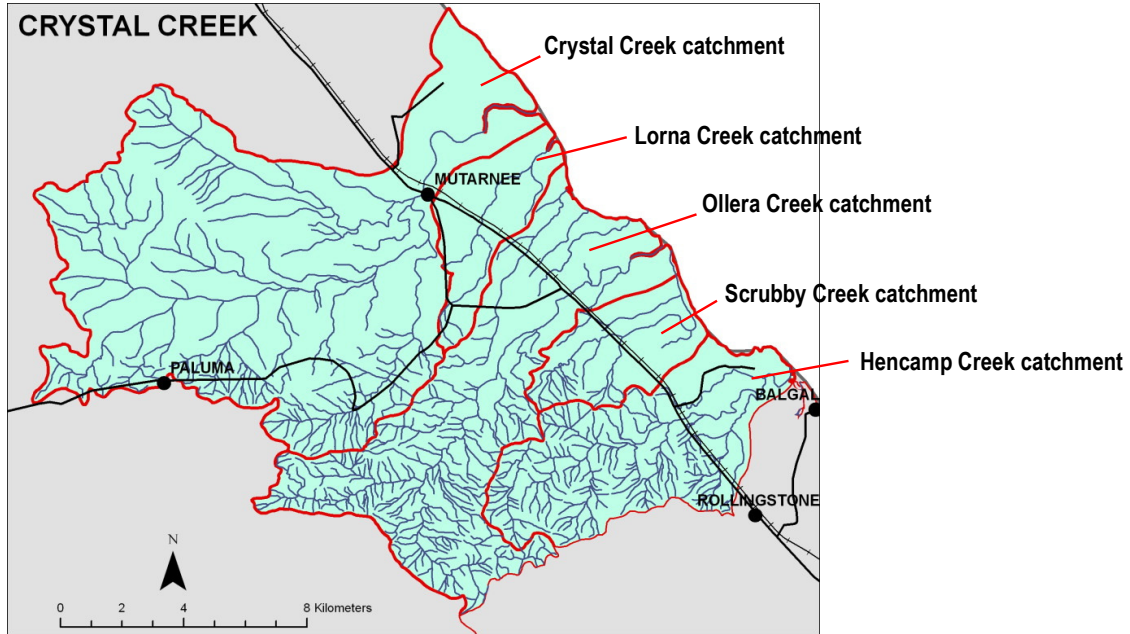
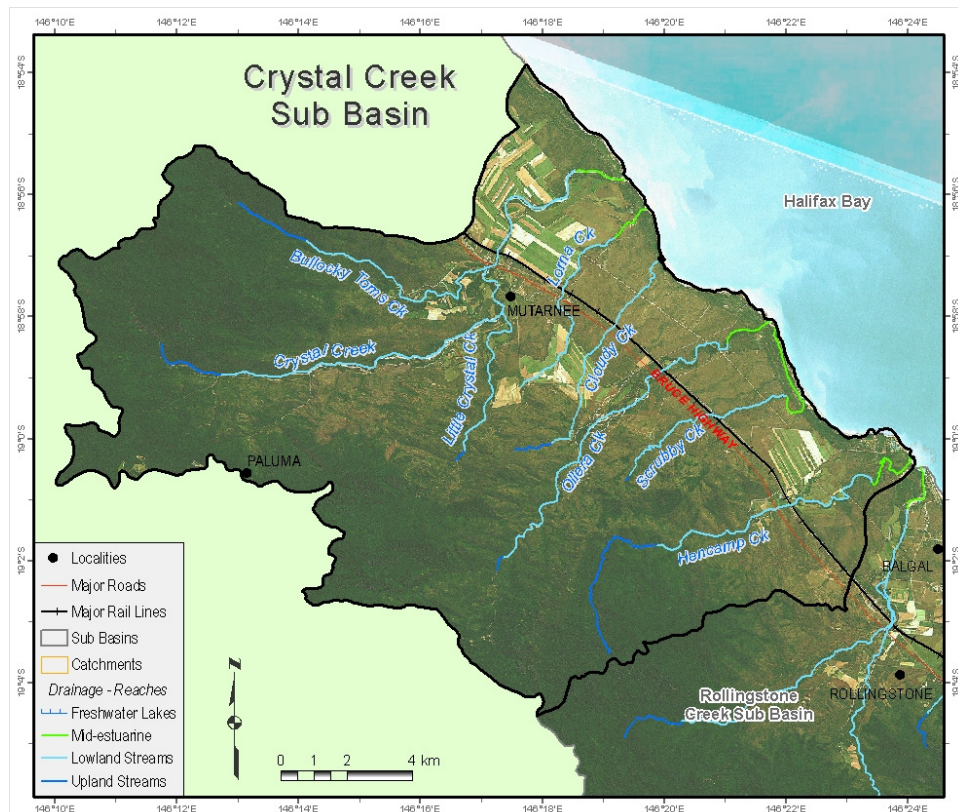


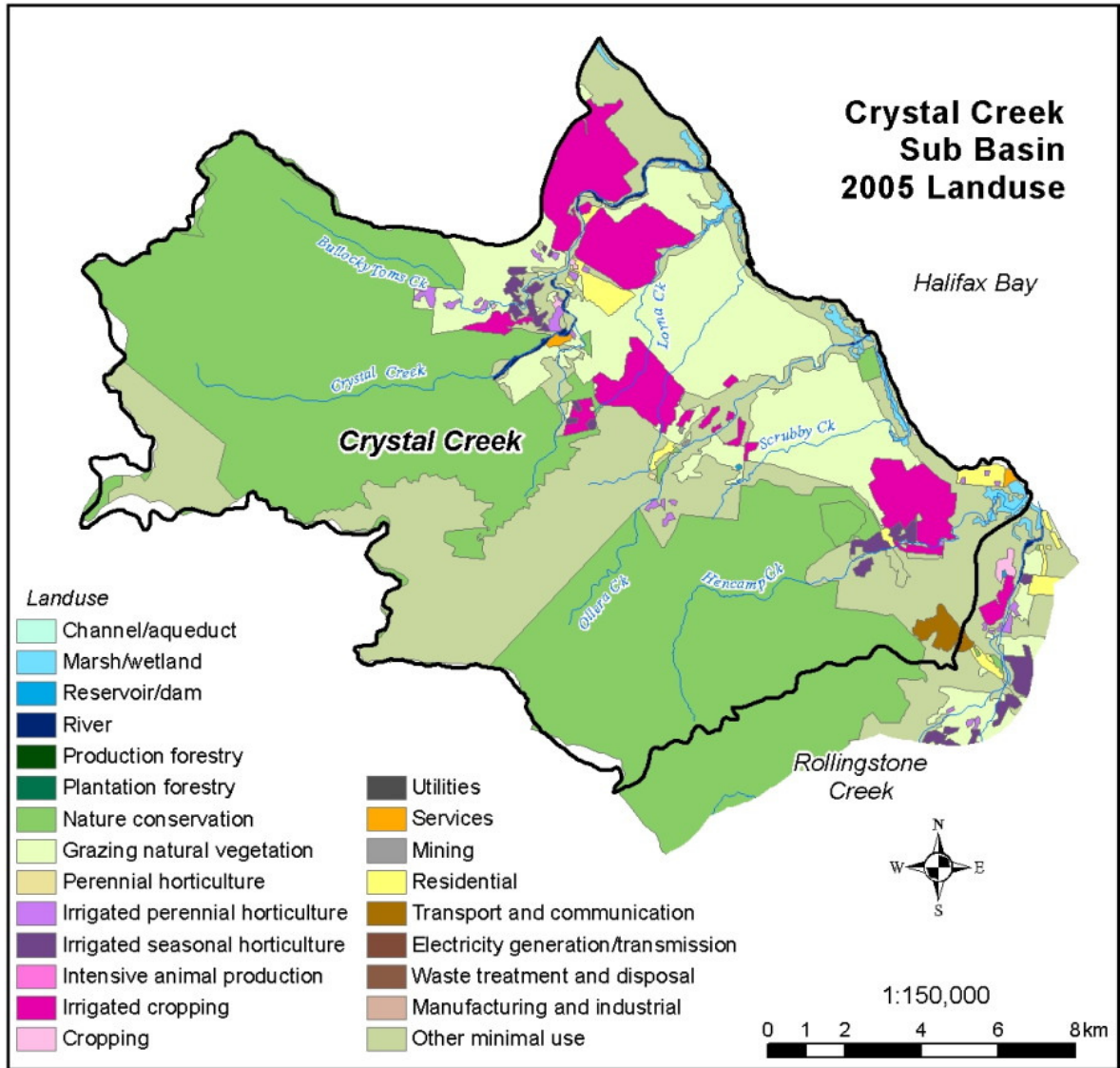
Figure 5.2 Crystal Creek Sub Basin Imagery



5.1 Crystal Creek Sub Basin Land Use

The Crystal Creek Sub Basin is approximately 240 square kilometres in size (~24,000 hectares). Nature conservation and other minimal use are the main land uses in the Crystal Creek Sub Basin accounting for approximately 80% of the land area. Grazing (10%) and irrigated cropping (sugar cane) (7%) are the most dominant of the agricultural land uses (see Figure 5.3 and Table 5.1).

Figure 5.3 Crystal 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 5.1 Crystal Creek Sub Basin Land Use

Land Use	QLUMP 1999		2005 Update	
	Area (ha)	Area (%)	Area (ha)	Area (%)
Cropping (Dryland)	10	<0.1	10	<0.1
Grazing natural vegetation	3,597	14.8	2,287	9.5
Irrigated cropping	1,579	6.5	1,697	7.1
Irrigated perennial horticulture	89	0.4	88	0.4
Irrigated seasonal horticulture	160	0.7	178	0.7
Marsh/Wetland	205	0.8	205	0.9
Mining	4	<0.1	4	<0.1
Nature conservation	12,041	49.5	11,786	49.2
Other minimal use	6,291	25.8	7,365	30.7
Perennial horticulture (Dryland)	4	<0.1	4	<0.1
Production forestry	1	<0.1	1	<0.1
Reservoir/Dam	2	<0.1	2	<0.1
Residential	189	0.8	171	0.7
River	61	0.3	61	0.3
Services	25	0.1	25	0.10
Transport and communication	85	0.4	85	0.4
Total	24,343	100	23,967	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.

5.2 Crystal Creek Sub Basin Demographics

The 2006 Census counted 339 people resident within the Paluma and Crystal Creek Sub Basin areas. Settlement is mainly confined to the hamlets of Paluma (142 people) and Mutarnee (not available). Dispersed settlement is associated with small-scale rural land holdings on the coastal plain, including sugar cane, exotic fruits and other crops. With the available figures it is estimated that the population of the Crystal Creek Sub Basin is 190 people.

Settlement in Paluma and the Crystal Creek Sub Basin is predominantly single-family dwellings with 80% of total dwelling stock comprised of separate dwellings (see Table 5.3).

Paluma and the Crystal Creek Sub Basin has a mature age population, particularly older couples, reflected in the high median age and the average household size, which at 2.5 persons is below the average occupancy of 2.8 for the Townsville local government area.¹

A significant number of Paluma and the Crystal Creek Sub Basin residents reported that they worked from home (31 people), possibly reflecting employment on farms and smallholdings and owner-resident tourism industries.²

The location and geography, along with current land zonings for the area indicate that significant urban expansion is unlikely within Paluma and the Crystal Creek Sub Basin, however expanded or intensified rural activity, including grazing, smallholdings, and tourist industry development may occur in the future.

Future settlement patterns related to tourist development potentially may include caravan or cabin style accommodation, buildings housing tourist attractions, function or meeting spaces and hardstand car parking and access ways.

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)

Selected medians and averages for Paluma and the Crystal Creek Sub Basin are shown in Table 5.2.

Table 5.2 Selected Medians and Averages ³

Description	Crystal Creek	Townsville
Median age of persons	47	33
Median individual income (\$/weekly)	330	531
Median family income (\$/weekly)	843	1,237
Median household income (\$/weekly)	629	1,101
Median housing loan repayment (\$/monthly)	2,000	1,231
Median rent (\$/weekly)	124	190
Average household size	2.5	2.8

Source: ABS 2006 Census of Population and Housing

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

Table 5.3 Count of Occupied Private Dwellings^(a) and Persons in Occupied Private Dwellings

Dwelling Type	Dwellings		Resident Persons	
	Count	%	Count	%
Separate house	105	80.2	247	85.2
Flat, unit or apartment:				
Flat, unit or apartment Total	0		0	
Other dwelling:				
Caravan, cabin, houseboat	19	14.5	35	12.1
Improvised home, tent, sleepers out	7	5.3	8	2.8
House or flat attached to a shop, office, etc.	0		0	
Other dwelling Total	26	19.8	43	14.8
Totals	131		290	

Source: ABS 2006 Census of Population and Housing

Notes: (a) Excludes 'Visitors only' and 'Other not classifiable' households. Figures are for the Crystal 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

5.3 Crystal Creek Sub Basin Land Use by Catchment

Land use summaries of the main catchments of the Crystal 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.

5.3.1 1-1 Crystal Creek catchment

The Crystal Creek catchment is approximately 11,600 hectares (~116 square kilometres) in area with the main land use being nature conservation and minimal use (84%). Grazing (8%) and irrigated cropping (sugar cane) (6%) are also significant land uses.

Table 5.4 Crystal Creek Catchment Land Use 1999 and 2005

Secondary Land Use - Tertiary Land Use		QLUMP 1999		2005 Update	
		Area (ha)	%	Area (ha)	%
Nature conservation	National park	7,105	59.8	7,047	60.8
	Natural feature protect.	240	2.0	130	1.1
	Other conserved area	9	0.1	9	0.1
Other minimal use		21	0.2	21	0.2
	Remnant native cover	2,637	22.2	2,528	21.8
Grazing natural veg.		870	7.3	869	7.5
Production forestry		1.4	0.0	0	0
Cropping		10	0.1	10	0.1
Perennial horticulture		1.2	<0.1	1.2	<0.1
Irrigated cropping	Irrigated sugar	708	6.0	711	6.1
Irrigated perennial horticulture	Irrigated tree fruits	65	0.5	64	0.5
Irrigated seasonal horticulture	Irrigated fruits	80	0.7	80	0.7
Residential	Rural residential	22	0.2	22	0.2
Services	Recreation and culture	13	0.1	13	0.1
River		58	0.5	58	0.5
Marsh/wetland		9	0.1	9	0.1
	Marsh/W Conservation	22	0.2	22	0.2
Total		11,871		11,594	

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.

5.3.2 1-2 Lorna Creek catchment

The Lorna Creek catchment is approximately 1,420 hectares in area (~14 square kilometres) with the main land use being grazing in native pasture (45%). While it is not a large area in the context of the Black Ross WQIP area a significant proportion of the catchment is used for sugar cane production (30%).

Table 5.5 Lorna Creek Land Use 2005

Primary Land Use	Secondary Land Use	Tertiary Land Use	Area (ha)	%
Conservation and natural environments (16.2%)	Nature conservation	National park	10	0.7
		Other conserved area	4	0.3
	Other minimal use	Remnant native cover	217	15.2
Production from relatively natural environments	Grazing natural vegetation		645	45.3
Production from dryland agriculture and plantations	Perennial horticulture		0.3	<0.1
Production from irrigated agriculture and plantations	Irrigated cropping	Irrigated sugar	425	29.9
	Irrigated perennial hort.	Irrigated tree fruits	1	0.1
	Irrigated seasonal hort.	Irrigated fruits	5	0.4

Intensive uses	Residential	Rural residential	82	5.8
Water	Marsh/wetland		2	0.1
		Marsh/W Conservation	32	2.2
Total			1,423	

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.

5.3.3 1-3 Ollera Creek catchment

The Ollera Creek catchment is approximately 5,865 hectares in area (~59 square kilometres) with the main land use being nature conservation and minimal use (74%). Grazing accounts for 21% of the catchment with sugar cane occupying 3% of the land area.

Table 5.6 Ollera Creek Land Use 2005

Primary Land Use	Secondary Land Use	Tertiary Land Use	Area (ha)	%
Conservation and natural environments (74.1%)	Nature conservation	National park	2,106	36.5
		Other conserved area	48	0.8
	Other minimal use	Remnant native cover	2,098	36.4
Production from relatively natural environments	Grazing natural vegetation		1,245	21.6
Production from dryland agriculture and plantations	Perennial horticulture		2	<0.1
Production from irrigated agriculture and plantations	Irrigated cropping	Irrigated sugar	183	3.2
	Irrigated perennial hort.	Irrigated tree fruits	17	0.3
Intensive uses	Residential	Rural residential	18	0.3
	Mining		4	0.1
Water	River		3	0.1
	Marsh/wetland		3	<0.1
		Marsh/W Conservation		42
Total			5,769	

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.

5.3.4 1-4 Scrubby Creek catchment

The Scrubby Creek catchment is approximately 1,470 hectares in area (~15 square kilometres) with the main land use being grazing in native pasture (54%). Nature conservation and minimal use accounts for most of the remainder of the catchment (42%).

Table 5.7 Scrubby Creek Catchment Land Use 2005

Primary Land Use	Secondary Land Use	Tertiary Land Use	Area (ha)	%
Conservation and natural environments (42.9%)	Nature conservation	National park	22	1.5
		Natural feature protect.	308	21.0
		Other conserved area	3	0.2
	Other minimal use	Remnant native cover	296	20.2
Production from relatively natural environments	Grazing natural vegetation		794	54.1
Production from irrigated agriculture and plantations	Irrigated cropping	Irrigated sugar	10	0.7
	Reservoir/dam		2	0.1
Water	Marsh/wetland	Marsh/W Conservation	32	2.2
Total			1,467	

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.

5.3.5 1-5 Hencamp Creek catchment

The Hencamp Creek catchment is approximately 3,720 hectares in area (~37 square kilometres) with the main land use being nature conservation and minimal use (74%). Dryland cropping is also a significant land use within the catchment (7%).

Table 5.8 Hencamp Creek Land Use 2005

Primary Land Use	Secondary Land Use	Tertiary Land Use	Area (ha)	%
Conservation and natural environments (83.7%)	Nature conservation	National park	76	2.0
		Natural feature protect.	2,023	54.4
	Other minimal use		96	2.6
Production from relatively natural environments	Grazing natural vegetation	Remnant native cover	917	24.7
			43	1.2
Production from dryland agriculture and plantations	Cropping		253	6.8
Production from irrigated agriculture and plantations	Irrigated cropping	Irrigated sugar	4	0.1
	Irrigated perennial horticulture	Irrigated tree fruits	1	<0.1
	Irrigated seasonal horticulture	Irrigated fruits	75	2.0
Intensive uses	Residential	Rural residential	67	1.8
	Services	Recreation and culture	12	0.3
	Transport and communication	Airports/aerodromes	85	2.3
Water	Marsh/wetland		2	0.1
		Marsh/W Conservation	62	1.7
Total			3,716	

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 5.9 Catchments Land Use Summary

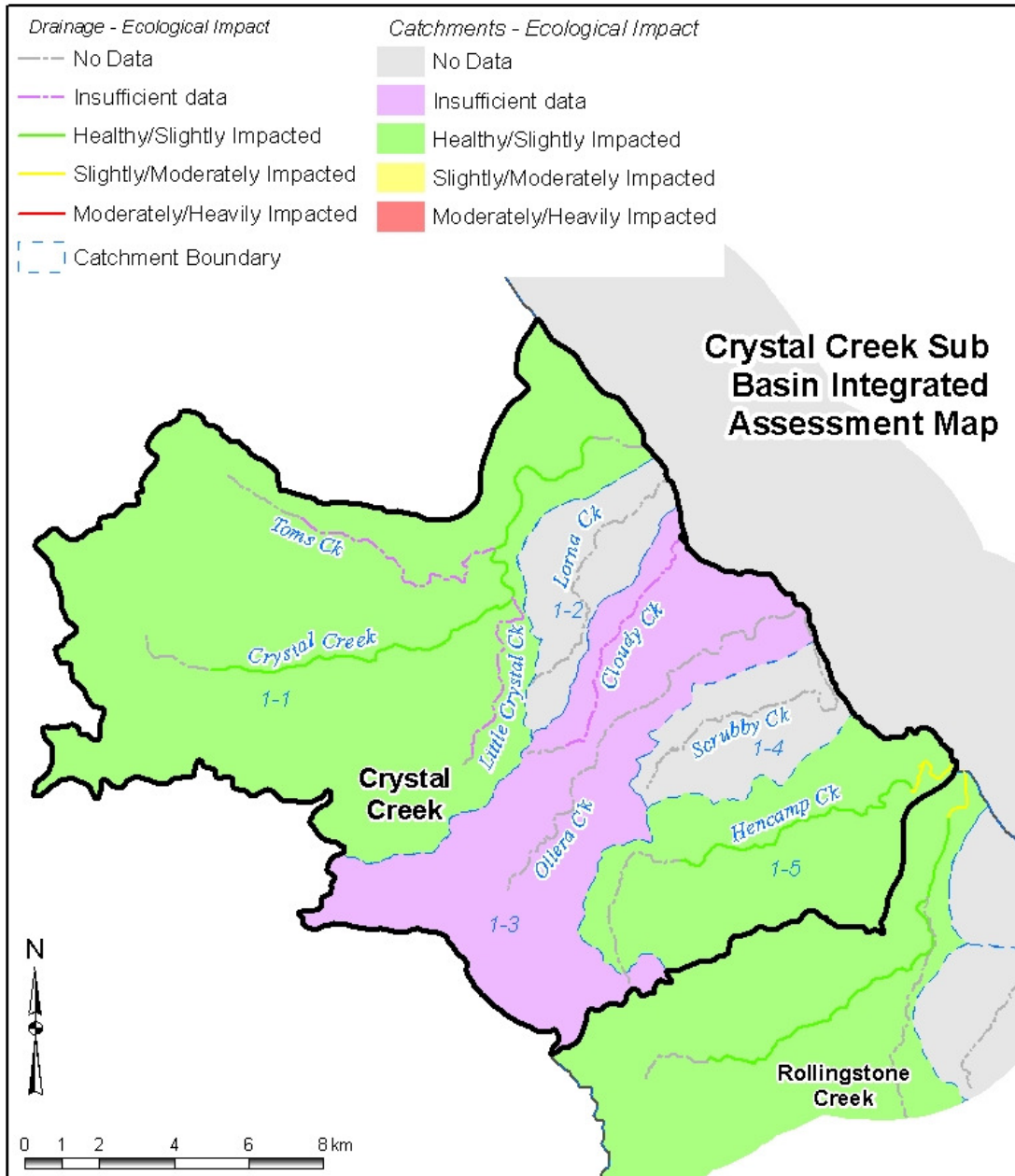
Principal Land Use	Crystal Creek (1-1)		Lorna Creek (1-2)		Ollera Creek (1-3)		Scrubby Creek (1-4)		Hencamp Creek (1-5)	
	Ha	%	Ha	%	Ha	%	Ha	%	Ha	%
Conservation and natural areas	9,735	84.0	230	16.2	4,252	73.7	629	42.9	3,061	82.4
Grazing	870	7.5	645	45.3	1,245	21.6	749	51.0	24	0.6
Rural residential	22	0.2	82	5.8	18	0.3			67	1.8
Intensive agriculture	864	7.5	432	30.4	202	3.5	55	3.8	404	10.9
Urban	13	0.1			4	0.1			96	2.6
Water and wetlands	89	0.8	33	2.3	48	0.8	34	2.3	64	1.7
Totals	11,592		1,424		5,769		1,467		3,716	

5.4 Crystal Creek Sub Basin Resource Condition

The Black Ross WQIP area water quality condition assessment (Connell Wagner 2008) rated two of the catchments, Crystal Creek and Hencamp Creek, as healthy. There was generally insufficient information to assess the remaining waterways and catchments (see Figure 5.4).

While there is insufficient data for a percentile-based assessment of Ollera Creek, the median of the available data was within the guideline values. Recent data shows that the water clarity for Crystal Creek and Hencamp Creek still rates as ecologically healthy.

Figure 5.4 Crystal 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)

5.5 Water Quality and Water Quality Objectives (WQOs)

When the water quality data was assessed against the water quality objectives (WQOs) derived from the Queensland Water Quality Guidelines (EPA 2006) for the Central Coast region for lowland streams (see Table 5.10), the water quality condition of the streams of the Crystal Creek Sub Basin met nearly all the corresponding WQOs. The only exception was for total suspended solids (TSS) in Hencamp Creek.

Table 5.10 Comparing WQOs (Central Coast values) with Water Quality

Crystal Creek Sub Basin	DIN	Org N	TN	FRP	TP	TSS
Crystal Creek 1-1	✓ 83%	✓ 77%	✓ 78%	✓ 90%	✓ 92%	✓ 80%
Hencamp Creek 1-5	✓ 56%	✓ 29%	✓ 32%	✓ 75%	✓ 60%	X 10%

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 percentage 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.

When comparing water quality condition to the WQOs derived from the Queensland Water Quality Guidelines (EPA 2006) based on the values for the Wet Tropics region lowland streams (see Table 5.11) (adopted in the Black Ross WQIP for the two northern sub basins), again Crystal Creek meets all the WQOs. Hencamp Creek however only meets one WQO out of the six water quality indicators i.e. dissolved inorganic nitrogen (DIN).

Table 5.11 Comparing WQOs (Wet Tropics values) with Water Quality

Crystal Creek Sub Basin	DIN	Org N	TN	FRP	TP	TSS
Crystal Creek 1-1	✓ 65%	✓ 53%	✓ 55%	✓ 50%	✓ 60%	✓ 80%
Hencamp Creek 1-5	✓ 13%	X 50%	X 52%	X 25%	X 100%	X 10%

[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)]