

Burdekin Integrated Water Quality Event Monitoring Program

2005/06 Wet Season Sampling Work Plan



Prepared for the BDTNRM to meet the requirements of the
Burdekin Community Water Quality Event Monitoring Project Milestone 2



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Part A Burdekin Integrated Water Quality Monitoring Program Update

As part of the Burdekin Community Water Quality Event Monitoring Project for Burdekin Dry Tropics NRM, the Australian Centre for Tropical Freshwater Research has been contracted to integrate event water quality monitoring projects in the region to reduce duplication of sampling efforts and to improve the communication, data sharing and collaboration amongst the regions stakeholders. Major stakeholders include industry, the scientific community, Local, State and Federal Government departments as well as the broader community. Support to integrate these projects is received from the State Governments' Water Quality State Investment Program (WQ SIP).

The primary objective of the project is to integrate all WQ event monitoring, from plot scale research studies to end of river mouth monitoring being undertaken in the Burdekin Region. Collaboration efforts to date include:

- an integrated Interim report (July 2005);
- meetings to plan wet season monitoring organised by ACTFR;
- continual networking/updates with the other organisations involved;
- support to other projects such as the NRMW GBR catchments loads monitoring project;
- overview information such as in section A.1 for BDTNRM and other stakeholders.

A.1 Water Quality Monitoring Projects involved in the Burdekin Dry Tropics Region

The 2005/06 sampling activities can be classed into 5 major categories based on sampling scale:

- 1) property/subcatchment scale: *Research* (sediment transport processes/ relationship between grazing/sugar cane and water quality);
- 2) sub catchment scale: Burdekin Dry Tropics NRM (ACTFR) *Community Water Quality Event Monitoring Project*;
- 3) major catchment scale: Natural Resources Mines and Water *Great Barrier Reef Catchments Loads Monitoring Program* Priority 5 major catchments sites (Belyando, Suttor, Cape, Upper Burdekin, Bowen)
- 4) whole of catchment: GBRMPA *Marine Monitoring Program* component (i)end of river mouth monitoring;
- 5) GBR lagoon flood plume: Burdekin Dry Tropics NRM *Coastal Catchment Initiative* Pesticide Study

The linkages between each of these projects, the Burdekin Dry Tropics NRM and the Reef Water Quality Protection Plan are shown in Figure 1. See Table 1 for more detailed information about each project including sampling locations/ methods, water quality parameters measured and the laboratories responsible for the analysis. Contact details for key personnel from each project have been provided in Appendix A.

Table 1 Burdekin Water Quality Monitoring Sampling Projects/Activities in the 2005/06 Wet Season

Activity		Organisation	Waterway	Location	Parameters	Field Method	Lab (+ method)
Research at property/ small subcatchment scale	Wambiana Grazing Trials (additional waterways data shared with community WQ monitoring project)	DPI&F (P.O'Reagain)	<ul style="list-style-type: none"> ▪ Flumes (on site refrig. autosampler) Additional Waterways (sampling pole method): <ul style="list-style-type: none"> ▪ Campaspe R ▪ Policeman Ck ▪ Oaky Ck ▪ Yarraman Ck 	<ul style="list-style-type: none"> ▪ Wambiana Station ▪ Cape-Campaspe catchment waterways 	<ul style="list-style-type: none"> ▪ TSS ▪ nutrients (N & P totals) ▪ TSS ▪ nutrients (N & P filtered and totals) 	<ul style="list-style-type: none"> ▪ TSS 1L (fridge) ▪ Nuts: 60ml (freeze) ▪ TSS 1L (fridge) ▪ Nuts: 60ml plus field filter 10ml (freeze) 	ACTFR standard lab methods
	Virginia Park Sediment Transport Experiment (Flumes)	CSIRO (D.Post, R.Bartley) DPI&F (B. Nelson)	<ul style="list-style-type: none"> ▪ Flume (on site refrig. autosampler) ▪ Weany Ck 	<ul style="list-style-type: none"> ▪ Virginia Park Station 	<ul style="list-style-type: none"> ▪ TSS ▪ nutrients (N & P totals) ▪ ? 	?	?
	Townsville Field Training Area	CSIRO/ ACTFR (D.Post/ D.Burrows)	<ul style="list-style-type: none"> ▪ Keelbottom Ck ▪ Thornton Ck ▪ Main Ck ▪ Fanning R (all autosamplers) 	<ul style="list-style-type: none"> ▪ Townsville Field Training Area 	<ul style="list-style-type: none"> ▪ TSS ▪ nutrients (N & P totals & filtered) ▪ Metals 	<ul style="list-style-type: none"> ▪ TSS 1L (fridge) ▪ Nuts: 60ml for totals ▪ Metals bottles (fridge) 	ACTFR standard lab methods
	Various other small catchment sites	CSIRO (D. Post, A.Hawdon)	<ul style="list-style-type: none"> ▪ Blue Range Ck (autosampler) 	<ul style="list-style-type: none"> ▪ Blue Range Station 	<ul style="list-style-type: none"> ▪ TSS ▪ nutrients (N & P totals & filtered) 	<ul style="list-style-type: none"> ▪ TSS 1L (fridge) ▪ Nuts: 60ml for totals ▪ Metals bottles (fridge) 	ACTFR standard lab methods
	Lower Burdekin MAFIA activities	CANEGROWERS (T.McShane)	<ul style="list-style-type: none"> ▪ cane drainage runoff/ alternative methods experiments to date project details confidential OR not yet established 	<ul style="list-style-type: none"> ▪ 	<ul style="list-style-type: none"> ▪ 		

Activity (CONT...)	Organisation	Waterway	Location	Parameters	Field Method	Lab (+ method)
BDTNRM (ACTFR) Community WQ monitoring at subcatchment scale	ACTFR with partners (J.Brodie, Z.Bainbridge)	<ul style="list-style-type: none"> Major subcatchment waterways across region (bucket / pole method) 	Burdekin River catchment & region inc. <ul style="list-style-type: none"> 30 community volunteer sites 5 major catchment sites 	<ul style="list-style-type: none"> TSS nutrients (N & P filtered and totals) Pesticides (at more limited intervals/locations) 	<ul style="list-style-type: none"> TSS 1L (fridge) Nuts: 60ml (unfiltered) plus field filter 10ml (x6, filtered) (freeze) Pest: 1L (fridge) 	ACTFR standard lab methods (QHSS for pesticides)
State Government GBR catchment loads monitoring program -Major 5 subcatchments of the Burdekin	NRMW (S.Catzikiris, P.Gilbey, G.Pocock, P.Kerr)	<ul style="list-style-type: none"> Bowen Suttor Belyando Cape Upper Burdekin 	<ul style="list-style-type: none"> Myuna (A/S) Mt Coolon-Belyando X-ing Rd Belyando X-ing Greg. Dev. Rd Flinders Hwy (QR bridge) 	<ul style="list-style-type: none"> TSS Nutrients (N & P filtered and totals) 	<ul style="list-style-type: none"> TSS 1L (fridge) Nuts: 250ml (unfiltered) plus field filter (40ml), (freeze) 	NRMW laboratory methods
GBRMPA Marine Monitoring Program section (i) End-of-river monitoring	Reef CRC/ AIMS/ (Community/ NRMW Hydrographers) (J.Waterhouse/ B.Schaffelke/ G.Pocock)	<ul style="list-style-type: none"> Burdekin (bucket and rope) Burdekin (P61) 	<ul style="list-style-type: none"> Home Hill @ Inkerman Bridge 	<ul style="list-style-type: none"> TSS nutrients (N & P filtered & totals) Chlorophyll 	<ul style="list-style-type: none"> TSS field filtration (cool & dry) Nuts: field filtration (freeze) Chl: field filtration 	AIMS standard lab methods
BDTNRM (ACTFR) CCI Pesticides Study Lower Burdekin & Flood Plume Monitoring (Note: flood plume monitoring to include sediments & nutrients)	ACTFR (V.McConnell J.Brodie)	<ul style="list-style-type: none"> Marine environment (bucket or pole method) Lower Burdekin major waterways 	<ul style="list-style-type: none"> Lagoon at mouth of Burdekin and Haughton/ Barratta systems 	<ul style="list-style-type: none"> TSS nutrients (N & P filtered and totals) Pesticides Chlorophyll 	<ul style="list-style-type: none"> TSS 1L (fridge) Nuts: 60ml (unfiltered) plus field filter 10ml (x6, filtered) (freeze) Pest: 1L (fridge) Chl-a:1L (fridge) 	ACTFR standard lab methods (QHSS for pesticides)
WQ SIP/ ACTFR Field & Lab Methods Investigations	NRMW (I.Duncan, S.Ross, J.Brodie, Z.Bainbridge)	<ul style="list-style-type: none"> Major 5 catchment sites plus end-of-river 	<ul style="list-style-type: none"> As listed in the State Government GBR catchment loads monitoring program section 	<ul style="list-style-type: none"> Testing TSS & Nutrients for: Field methods: <ul style="list-style-type: none"> Edge VS middle Freq. of sample Bucket vs. sample pole Freezing times Lab methods: <ul style="list-style-type: none"> Inter-lab comparisons 	<ul style="list-style-type: none"> Various 	<ul style="list-style-type: none"> AIMS standard lab methods ACTFR standard lab methods QHSS standard lab methods NRMW standard lab method

Part B Burdekin Community Water Quality Event Monitoring Project Status Update

Since the 2004/05 wet season, the Burdekin Community Water Quality Event Monitoring Project has:

- Expanded the number of volunteers and sample sites;
 - Improved volunteer sampling documentation and equipment;
 - Developed a formalised risk assessment process including volunteer insurance through the BDTNRM;
 - Implemented a formalised process for volunteer sampling training and safety induction;
 - Participated in a field and laboratory methods investigation that is part of the collaborative partnership between ACTFR, AIMS, NRMW, QHSS and WQ SIP.
- **Additional volunteer sites:** The number of volunteer sites increased from 12 in the 2004/05 wet season to 30 volunteer sites in 2005/06. The additional sites are located within priority areas of the Burdekin catchment (Upper Burdekin, Belyando), waterways in the Townsville Thuringowa coastal plain, the Lower Burdekin (Barrattas/Haughton area) and major waterways surrounding the Bowen township (i.e. Euri Ck, Don River). These additional sites provide a better representation of the dominant land use type with the varying environmental parameters (e.g. elevation, geology, vegetation, rainfall) throughout the Burdekin catchment. The new monitoring sites within the coastal waterways of the Burdekin Region provide a valuable resource to assess coastal water quality in areas of urban, industry, cropping and horticulture.
- **Volunteer sampling documentation and field sample box for volunteers:** In conjunction with NRMW staff from the Mackay Whitsunday NRM Groups' Event Monitoring Project, an illustrated field sampling procedures document has been produced for the volunteers. This document is based on ACTFR laboratory methods and has been expanded to include information about issues specific to event monitoring. The document includes step-by-step images of the individual sampling procedures. A more formalised sampling record sheet and a fridge magnet with easy to access project contact details has also been developed. Each volunteer has been given a field box (Figure 2) that contains sampling and safety items to assist the volunteer during the sampling process.



Figure 2 Volunteer Field Sample Box including clipboard with instruction sheet and sample record sheet, fridge magnet, water quality sample kits (containers, filters, syringes), bucket and rope, stirrer, first aid kit/manual and rain coats.

- **Risk assessment procedures/ volunteer insurance:** A formalised risk assessment process has been developed in conjunction with staff from the Mackay Whitsunday NRM Groups' Event Monitoring Project. It provides a step-by-step process for a project officer to conduct individual site risk assessments and an emergency evacuation plan. This process is based upon the 'Queensland Health and Safety Guidelines for community-based waterway monitoring' manual which was recently produced by NRMW with assistance from Conservation Volunteers Australia. This risk assessment process is the first to be implemented in a community-based water quality monitoring group in Queensland. Volunteer insurance has now also been provided to Burdekin volunteers through an agreement between ACTFR, BDTNRM and NRMW. Each volunteer has signed a BDTNRM Volunteer Registration Form and been given a safety induction (as part of the risk assessment process) by the project officer. This volunteer registration form has also been taken from the 'Queensland Health and Safety Guidelines for community-based waterway monitoring' manual.
- **Implementation of volunteer sampling training and safety induction:** Procedures for project officer to implement sampling training and safety inductions were developed into a flow chart step-by-step process that is outlined in Figure 3. Individual property visits were conducted (Oct 2005-February 2006) to train new volunteers and provide safety inductions (undertake the risk assessment process) to all volunteers using the new procedures developed. Most training was undertaken at the volunteers homestead (with a visit to the sampling site to fill out the risk assessment and emergency evacuation plan), however, some training was conducted at the end of Landcare group meetings or other organised venues. As most sites are considerable distances from Townsville, sampling and safety training was usually conducted at the same time. A check list with all sites visited and volunteer registration forms will be provided to BDTNRM.
- **Field and laboratory methods investigation:** A range of field and laboratory method investigations will be undertaken this wet season to address QA/QC problems with event monitoring procedures that were identified during the 2004/05 wet season. Similar QA/QC problems were also encountered by other event monitoring projects, and as result a discussions workshop was held by WQ SIP in Brisbane (late 2005) to formally identify limitations of the current sampling and analytical procedures. These limitations are the focus of our current investigations which aim to improve sampling methods for future use in the Burdekin Region. As part of a collaborative investigation with AIMS, NRMW, QHSS and WQ SIP, the Burdekin Community Water Quality Monitoring Project will undertake sampling method investigations including those conducted in the field as well as a inter-lab comparison to access the performance of the four main laboratories utilised in Queensland for event monitoring.

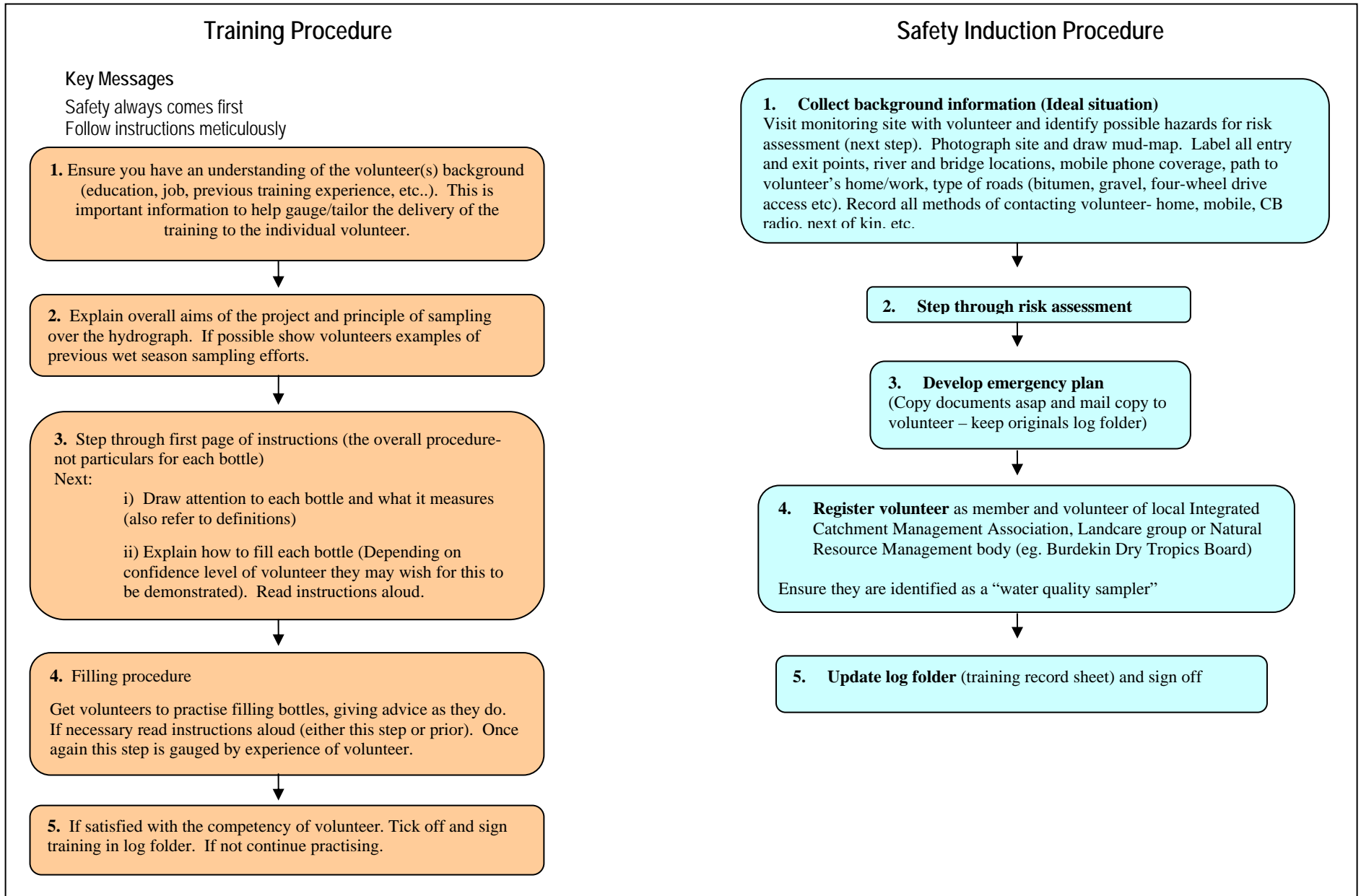


Figure 3 Training and Safety Procedures for Volunteer Inductions

B.1 2005/06 Wet Season Sampling Work Plan

Aside from the community volunteer sampling sites, ACTFR with WQ SIP will be sampling the 5 major Burdekin catchment sites as well as a number of smaller waterways in the region. Details of these sites have been provided in the sampling work plan (Table 2). Sites have been broken up into three main sampling 'runs' for logistical purposes as follows:

- 1) Lower Burdekin rivers
- 2) Cape, Belyando and Suttor Rivers
- 3) Upper Burdekin River plus minor rivers

At the major catchment sites field and lab methods investigations will be conducted, including:

- Edge vs. middle effects
- Bucket vs. sampling pole
- Delayed filtering in the field environment
- Inter-lab comparisons

Therefore, at these four locations (the fifth major catchment has a BDTNRM autosampler being managed by CSIRO) we will be sampling for the Burdekin Community Water Quality Event monitoring project (going to the ACTFR lab), the NRMW GBR Catchments Loads Estimation Monitoring Program (NRMW Lab) and WQ SIP (QHSS lab). This will be the first opportunity to directly compare laboratory results where projects/organisations are working together to ensure field sampling conditions are the same for each project.

Table 2: Sampling Work Plan for the 2005/06 Wet Season

Sampling Run One: Lower Burdekin					
Waterway	Location	GPS Position	Sampling site access	Contact	Sampling to be conducted
Haughton River (H2)	Old Cane Crossing near Bruce Hwy	S 19°32.55 E 147°06.51	Edge with bucket		ACTFR sed/nut kit + 2x pesticide bottles (5-8 times across hydrograph)
Barratta Ck West (B1)	Bruce Hwy	S 19°34.10 E 147°12.22	Edge with pole		ACTFR sed/nut kit + 2x pesticide bottles
Barratta Ck East (B2)	Bruce Hwy	S 19°34.16 E 147°13.16	Edge with pole		ACTFR sed/nut kit
Barratta Ck Upper (B3)	Clare Rd	S 19°42.30 E 147°08.46	Middle with bucket		ACTFR sed/nut kit
Iyah Ck (I1)	Charlies Hill Rd		Middle with pole		ACTFR sed/nut kit + 2x pesticide bottles
Plantation Ck (P1)	Rita Island Rd	S 19°35.10 E 147°25.32	Middle with pole		ACTFR sed/nut kit + 2x pesticide bottles
Sheep Station Ck (S2)	Fives Ways Rd (rest stop rd before Brandon)	S 19°35.37 E 147°20.01	Middle with pole		ACTFR sed/nut kit + 2x pesticide bottles
Yellow Gin Ck (Y1)	Bruce Hwy		Edge with pole		ACTFR sed/nut kit + 2x pesticide bottles

Sampling Run Two: Cape, Belyando Suttor (& Campaspe)					
Waterway	Location	GPS Position	Sampling site access	Contact	Sampling to be conducted
Cape River	Gregory Developmental Road	S 20°59'53" E 146°25'33"	Stream Centre: NRMW agreement with Main Roads -put out signs and cones each time we sample. All forms submitted to Main Roads Feb'06 <hr/> If bridge goes under: backup boat to collect samples	Main Roads: Leister Hardie 4720 7476 Send off fax: Traffic Management Plans approved when main roads are advised when signs are in place (ancillary works and encroachment plan)	For each sample run (5-8) : <ul style="list-style-type: none"> ▪ NRMW loads monitoring program TSS & Nutrients (NRMW Laboratory kits and methods) ▪ ACTFR: TSS & Nutrients (ACTFR kits and methods) ▪ WQ SIP methods investigation TSS & Nutrients (QHSS kits & methods) 3-4 times throughout sampling hydrograph (rise and peak) <ul style="list-style-type: none"> ▪ 1x1L container of TSS (Michelle Cooper for particle sizing) 1x pesticide 1L bottle
Belyando River	Gregory Developmental Road @ Belyando Crossing	S 21°32'02" E 146°51'38"	Stream Centre: NRMW agreement with Main Roads -put out signs and cones each time we sample. All forms submitted to Main Roads Feb'06 <hr/> If bridge goes under: backup boat to collect samples		For each sample run (5-8) : <ul style="list-style-type: none"> ▪ NRMW loads monitoring program TSS & Nutrients (NRMW Laboratory kits and methods) ▪ ACTFR: TSS & Nutrients (ACTFR kits and methods) ▪ WQ SIP methods investigation TSS & Nutrients (QHSS kits & methods) 3-4 times throughout sampling hydrograph (rise and peak) <ul style="list-style-type: none"> ▪ 1x1L container of TSS (Michelle Cooper for particle sizing) 1x pesticide 1L bottle
Suttor River	Mt Coolon- Belyando Crossing Road	S 21°32'13" E 146°51'38"	Stream Centre: NRMW agreement with Main Roads -put out signs and cones each time we sample. All forms submitted to Main Roads Feb'06 <hr/> If bridge goes under: backup boat to collect samples		For each sample run (5-8) : <ul style="list-style-type: none"> ▪ NRMW loads monitoring program TSS & Nutrients (NRMW Laboratory kits and methods) ▪ ACTFR: TSS & Nutrients (ACTFR kits and methods) ▪ WQ SIP methods investigation TSS & Nutrients (QHSS kits & methods) 3-4 times throughout sampling hydrograph (rise and peak) <ul style="list-style-type: none"> ▪ 1x1L container of TSS (Michelle Cooper for particle sizing) 1x pesticide 1L bottle
Campaspe River	Nosnillor Rd off GDR (nth of Cape River)	S 20°56'53." E 146°21'37"	Edge with bucket or pole		ACTFR sample kit and methods

Sampling Run Three: Upper Burdekin					
Waterway	Location	GPS Position	Sampling site access	Contact	Sampling to be conducted
Burdekin River (Upper)	Sellheim Railway Bridge	S 19°59'55" E 146°26'13"	Stream Centre: NRMW agreement with Q-Rail to conduct daily sampling during an event with a QR employee present NOTE: Only ACTFR staff that signed up as NRM volunteers can do this run	Q Rail: Noel Shadbolt M: 0408 185 457	For each sample run (5-8) : <ul style="list-style-type: none"> ▪ NRMW loads monitoring program TSS & Nutrients (NRMW Laboratory kits and methods) ▪ ACTFR: TSS & Nutrients (ACTFR kits and methods) ▪ WQ SIP methods investigation TSS & Nutrients (QHSS kits & methods) 3-4 times throughout sampling hydrograph (rise and peak) <ul style="list-style-type: none"> ▪ 1x1L container of TSS (Michelle Cooper for particle sizing) ▪ 1x pesticide 1L bottle
Fanning River	Bivouac Junction Road just before Macrossan bridge, follow rd 5km to grid bridge		Sampling pole from edge of bank depending on conditions		ACTFR kits and methods
Haghton River (upper)	Cardington Rd (off Flinders Hwy, after Mobil @ Calcium, follow rd 3km to grid bridge)		Sampling pole from edge of bank depending on conditions		ACTFR kits and methods
Reid River	Off Flinders Hwy		Sampling pole from edge of bank depending on conditions		ACTFR kits and methods

Additional Sampling Locations					
Bowen River	Myuna Station	S 20°35'01.0" E147°35'47.0"	Autosampler		CSIRO to collect TSS, TNTP, filtered nutrients

Burdekin Integrated Water Quality Event Monitoring Program: 2005/06 Wet Season Sampling Work Plan

Catchment	Waterway	Property	Sample Location
Upper Burdekin *Members of Three Rivers Landcare Group	Dry River	Jervoise Stn	Access Rd to property
	Camel Ck*	Camel Ck Stn	Property
	Running River*	Ewan Hills Stn	Property
	Star River*	Kirkland Downs Stn	Property
	Clarke River*	Chirstmas Ck Stn	Access from Greg Dev Rd
	Maryvale Ck*	Niall Stn	Property
	Basalt River	Hillgrove Stn	Property
	Fletcher Ck	FletcherVale	Property
	Lolworth Ck	Lockwall Stn	Property
East Burdekin	Kirk River	Kirk River Stn	Property
	Elphinstone Ck	Kirkton Stn	Property
	Stone Ck	Old Glenroy Stn	Property
	Burdekin Falls Dam Outlet Overflow	SunWater	BFD
	Landers Ck x2 locations	Millaroo	Property/ Access Dalbeg Rd
	Expedition Pass Ck/ Eight Mile Ck	Dalbeg	Property/ Access Dalbeg Rd
Bowen region	Euri Ck	Bowen	Property
	Don River	Bowen	Property
Bowen Broken/ Bogie	Broken River (Upper)	Broken River property	Eungella Dam Rd access
	Bogie River (Upper)	Mt Pleasant Stn	Property
	Bogie River (Lower)	Kirknie Stn	Property
Belyando/ Suttor	Belyando River (Upper)	Surbiton Stn	Property
	Native Companion Ck (Upper)	Surbiton Stn	Property
	Mistake Ck (Upper)	Merrigang Stn	Property
	Mistake Ck (Lower)	Disney Stn	Property
Townsville Thuringowa *Member of Bluewater Landcare Group	Bluewater (Upper)*	Blue Hills	Property
	Bluewater (Lower)*	Bluewater Landcare Group members	Old Bruce Hwy (footbridge)
	Louisa Ck	Creek 2 Coral/ CitiWorks	Bayswater Rd

	Stuart Ck	Creek 2 Coral/ CitiWorks	Access near Bruce Hwy
	Bohle River	Creek 2 Coral/ CitiWorks	Access near Bruce Hwy
	Lakes x2 locations	Creek 2 Coral/ CitiWorks	Inflow/ Outflow