

Summary of Hydrometeorological and Water Quality Data Collection in the Coppermine River Drainage Basin and the Central Arctic Region

Denise Bicknell & Bob Reid
DIAND Water Resources, Yellowknife
25 May 2001

Introduction

The following report is a summary of the water quantity and water quality data collection in the Coppermine River basin and the surrounding areas of the Slave and Bear Geological Provinces. The data collection listed are hydrometric stations, weather stations, snow survey sites and water quality sites. The locations, periods of record and parameters measured are described briefly and tabulated. Maps of the station locations are provided.

Hydrometric Stations

There are five active hydrometric stations in the Coppermine River basin, three of which were installed within the past eight years. There are historic data for four other stations within the basin. Outside the basin, but in the same general physiographic region, there are 10 operating hydrometric stations and historic data for three others. Mean daily and monthly discharge data and annual extremes data are published to 1999 in Hydat, a CD database (Environment Canada, 2001) and will soon be available on the internet. Real-time water level data are currently available on the DIAND website www.inacnt.internorth.ca/hydrographs. Table 1 lists station locations, periods of record and some descriptive statistics for the hydrometric gauges in and around the Coppermine basin.

Weather Stations

Currently, there are four weather stations operating in the Coppermine Basin. Seven weather stations are operated outside the basin in the Slave and Bear Geological Provinces, plus there are historic data for two other stations. Most stations were installed in the 1990s. Station locations, periods of record and data parameters are in Table 2. Data records are currently held by the station operators. DIAND data will soon be available on the DIAND website.

Three of the weather stations, Salmita, Colomac and Ekati, have a specific sensor configuration for calculating lake evaporation with the Penman Combination Method. These stations are located in shallow water near the shore of small lakes. Detailed water balance studies have also been done at the Lower Carp Lake study sites by DIAND and DOE staff. Several special purpose weather stations have operated since 1997, including a lake evaporation station (Penman) from June 1997 to September 1999 on Lower Carp Lake. This station was relocated to a small basin, Skeeter Lake, for the summer of 2000. Evaporation rates are also being modeled using the Bowen Ratio Method with data from a floating weather station on Skeeter Lake (1999 and 2000). The Eddy Correlation method is being used to calculate terrestrial evaporation rates (1998 to 2000) from another station within the Skeeter Lake basin. The Lower Carp Lake study site is located about 120 km southwest of the Coppermine basin.

Snow Survey Sites

There are no snow survey sites within the Coppermine basin. However, in nearby areas of the Snare and Yellowknife River Basins, there are 12 snow survey sites in a similar physiographic region. The sites are located within about 100 km, to the south and southwest of the Coppermine basin. Data for the sites are available on the DIAND website http://internew.inac.gc.ca/nt/wrd/smp_e.html. Table 3 lists the site locations, period of record and mean snow water equivalent at the end of winter.

Water Quality Monitoring in the Coppermine Basin

The seven water quality sites listed in Table 4 have been active periodically since 1960. The operator of these sites has been DIAND and/or DOE over the period of record. In 2000, DIAND Water Resources began taking regular monthly samples at each site in preparation for the Cumulative Aquatic Effects Monitoring Program. The parameters for the samples include ICP Mass Spectroscopy 23 metal scan, nutrients, and routine analysis.

Historic water quality data are available for another 20 sites in the Coppermine basin from miscellaneous samples taken by Environment Canada over the past 40 years (Table 5). Data are available on the ACBIS and EcoAtlas CD database, Version 903 (March 2001).

Miscellaneous samples have been taken at 34 sites in the Coppermine basin by DIAND Water Resources (Table 6). These data provide a baseline for water quality with samples from either August 1999 or August 2000, or both in some cases. The parameters for the samples include ICP Mass Spectroscopy 23 metal scan, nutrients, and routine analysis.

Abbreviations

- ACBIS** - Aquatic Chemistry and Biological Information System
- BHP** - Broken Hills Proprietary (Ekati Mine)
- DDMI** - Diavik Diamond Mines Inc.
- DIAND** - Department of Indian Affairs and Northern Development
(INAC - Indian and Northern Affairs Canada)
- DOE** - Department of Environment
(EC - Environment Canada)
- MSC** - Meteorological Services of Canada
- WSC** - Water Survey of Canada
- SWE** - Snow Water Equivalent

Table 1 (a). HYDROMETRIC STATIONS IN THE COPPERMINE RIVER DRAINAGE BASIN (WSC)

STATION ID	STATION NAME	STATUS	LATITUDE	LONGITUDE	PERIOD OF RECORD	YEARS OF RECORD	MEAN ANNUAL FLOW (m3/s)	MEAN PEAK FLOW (m3/s)	MEAN LOW FLOW (m3/s)	MEAN TOTAL ANNUAL FLOW (10 ⁶ m3/yr)	BASIN AREA (km2)	BASIN YIELD (mm/yr)
10PC002	Atitok Creek Near Dismal Lakes	closed	67.214	-116.609	1979 to 1990	12	2.71	45.3	0	43	217	198
10PC003	Coppermine River above Bloody Falls	closed	67.740	-115.379	1983 to 1986	4	338	1530	69.5	11000	50700	217
10PC004	Coppermine River above Copper Creek	open	67.228	-115.888	1987 to present	13 +	256	1320	59.1	8100	46800	173
10PB001	Coppermine River at Outlet of Point Lake	open	65.413	-114.004	1965 to present	35 +	109	253	34.4	3400	19300	176
10PA001	Coppermine River below Desteffany Lake	open	64.616	-111.954	1994 to present	6 +	n/a	n/a	n/a	n/a	6110	n/a
10PC005	Fairy Lake River near outlet of Napaktulik Lake	open	66.252	-113.985	1993 to present	7 +	38.4	58.8	22.6	1200	6680	180
10PB002	Izok Lake Inflow	closed	65.640	-112.863	1993 to 1994	2	2.21	19.3	0	69		
10PC001	Kendall River Near Outlet Dismal Lakes	closed	67.214	-116.576	1969 to 1990	22	15.1	183	0	450	2790	161
10PA002	Yamba River below Daring Lake	open	64.780	-111.680	2000 to present	no data published yet	n/a	n/a	n/a	n/a		n/a

Table 1 (b). HYDROMETRIC STATIONS NEAR THE COPPERMINE RIVER DRAINAGE BASIN (WSC)

STATION ID	STATION NAME	STATUS	LATITUDE	LONGITUDE	PERIOD OF RECORD	YEARS OF RECORD	MEAN ANNUAL FLOW (m3/s)	MEAN PEAK FLOW (m3/s)	MEAN LOW FLOW (m3/s)	MEAN TOTAL ANNUAL FLOW (10 ⁶ m3/yr)	BASIN AREA (km2)	BASIN YIELD (mm/yr)
10JA004	Acasta River Above Little Crapeau Lake	closed	64.880	-116.140	1980 to 1994	15	11.7	96.6	0.37	370	2280	162
10RA001	Back River below Beechy Lake	open	65.187	-106.086	1978 to present	22 +	109	924	0.98	3400	19600	173
10RA002	Baillie River near the Mouth	open	65.011	-104.491	1978 to present	22 +	76.3	1450	0.103	2600	14500	179
10QC004	Burnside River at Outlet of Contwoyto Lake	open	66.072	-111.217	1993 to present	7 +	37.5	92.9	9.69	1200		
10QC001	Burnside River near the mouth	open	66.736	-108.819	1976 to present	24 +	126	1370	6.7	4000	16800	238
10JA002	Camsell River at Outlet of Clut Lake	open	65.607	-117.765	1963 to present	37 +	97.1	130	64.3	3100	31100	100
10QC003	Contwoyto Lake at Lupin Mine	open	65.766	-111.229	1991 to present	level records only	n/a	n/a	n/a	n/a		n/a
10JE002	Great Bear Lake at Hornby Bay	open	66.613	-117.606	1984 to present	level records only	n/a	n/a	n/a	n/a		n/a
10QB001	Hood River near the Mouth	open	67.342	-108.927	1994 to present	6 +	73.1	752	0	2200		
07SA004	Indin River above Chalco Lake	open	64.389	-115.021	1977 to present	23 +	7.86	44.7	0.58	240	1520	158
07RC002	Thonokied River below Afridi Lake	closed	64.200	-108.960	1994 to 1996	2 partial years	n/a	n/a	n/a	n/a		n/a
07RC001	Thonokied River Near the Mouth	closed	64.147	-108.917	1980 to 1990	11	14.6	77.9	0	310	1780	174
10QA001	Tree River near the mouth	open	67.634	-111.909	1968 to present	32 +	34	125.9	4.96	1100	5810	189

Table 2. WEATHER STATIONS IN AND NEAR THE COPPERMINE RIVER BASIN

	Daring Lake*	Ekati Mine*	Diavik Mine*	Kugluktuk*	Lupin	Salmitta	Colomac	Indin River	Camsell River	Walker Bay	Lower Carp	Wright River
Operator	DIAND	BHP	DDMI	MSC	MSC	DIAND	DIAND	WSC	WSC	DIAND	MSC	DIAND
Status	open	open	open	open	open	open	open	open	open	open	open	closed
Latitude	64.87	64.67	64.5	67.82	65.77	64.05	64.43	64.39	65.61	68.35	63.62	66.81
Longitude	111.58	110.67	110.25	115.13	111.23	111.18	115.07	115.02	117.77	108.08	113.85	110.41
Period of Record	1996 -	1994 -	1995 -	1930 -	1982 -	1992 -	1995 -	1994 -	1993 -	1996 -	1998 -	1997 - 99
Data Parameters												
Air Temperature	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Relative Humidity	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Wind Speed	Y	Y	Y	Y	Y	Y	Y			Y	Y	Y
Wind Direction	Y	Y	Y	Y	Y	Y	Y			Y	Y	Y
Solar Radiation	Y			Y*		Y				Y		Y
Net Radiation	Y	Y				Y	Y					
Rainfall	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Snow Depth	Y	Y		Y	Y					Y	Y	Y
Water Temperature	Y	Y		n/a	n/a	Y	Y	Y	Y	n/a	n/a	n/a
Soil Temperature	5 point									3 point		3 point
Soil Moisture	2 point											2 point
Barometric Pressure				Y	Y			Y	Y		Y	

* Stations within the Coppermine River Basin

Y* hours of bright sunshine

Table 3. ACTIVE SNOW SURVEY SITES NEAR THE COPPERMINE RIVER DRAINAGE BASIN (DIAND)

SITE NAME	LATITUDE	LONGITUDE	YEARS OF RECORD	PERIOD OF RECORD	MEAN SWE (mm)
Big Lake	64.800	-112.930	5	from 1995	113
Castor Lake	64.515	-115.989	23	from 1979	117
Christison Lake	64.650	-114.200	7	from 1995	114
Ghost Lake	63.878	-115.069	24	from 1978	105
Indin Lake	64.379	-115.026	24	from 1978	111
Jolly Lake	64.120	-112.210	3	1995 to 98	141
Mattberry Lake	64.089	-115.955	23	from 1979	98
Mesa Lake	64.845	-115.138	23	from 1979	124
Nardin Lake	63.510	-113.850	14	from 1988	118
Sharples Lake East	63.900	-112.820	14	from 1988	123
Snare Lake	64.202	-114.039	24	from 1978	118
White Wolf Lake	65.010	-114.110	7	from 1995	114
Winter Lake	64.500	-113.030	23	from 1978	78

Table 4. ACTIVE WATER QUALITY SITES IN THE COPPERMINE RIVER DRAINAGE BASIN (DIAND)

SITE ID	SITE NAME	LATITUDE	LONGITUDE	PERIOD OF RECORD	YEARS OF RECORD
00NW10PA0003	COPPERMINE RIVER AT OUTLET OF LAC DE [GRAS]	64.583	-111.183	*	
00NW10PA0004	COPPERMINE RIVER BELOW DESTEFFANY LAKE	64.599	-111.955	1995 to present	6+
00NW10PB0001	COPPERMINE RIVER AT OUTLET OF POINT LAKE	65.417	-114.008	1972 to present	28+
00NW10PC0001	COPPERMINE RIVER NEAR [THE] MOUTH [AT]	67.804	-115.091	1960 to 1996 plus 2001	38+
00NW10PC0012	COPPERMINE RIVER DOWNSTREAM OF FAIRY [LAKE RIVER]	66.167	-114.267	*	
00NW10PC0013	FAIRY [LAKE] RIVER 5.0KMS UP FROM MOUTH	66.150	-114.250	1995 to present	6+
00NW10PC0019	COPPERMINE RIVER ABOVE COPPER CREEK	67.229	-115.888	2000 to present	1+

Table 5. INACTIVE WATER QUALITY SITES IN THE COPPERMINE RIVER DRAINAGE BASIN (MSC - DOE)

SITE ID	SITE NAME	LATITUDE	LONGITUDE	YEARS OF RECORD
00NW10PA0001	COPPERMINE RIVER AT OBSTRUCTION RAPIDS	64.900	-112.333	*
00NW10PA0002	[V]AMBA [Yamba] LAKE OUTLET - DARING LAKE	64.800	-111.683	*
00NW10PA0005	YAMBA RIVER BELOW DARING LAKE	64.867	-111.597	*
00NW10PB0002	RAWA[L]PINDI RIVER NEAR THE MOUTH	65.433	-114.500	*
00NW10PB0003	ITCHEN LAKE OUTLET	65.400	-113.000	*
00NW10PC0002	ECSTALL RIVER	66.074	-112.826	*
00NW10PC0003	ECSTALL RIVER	66.054	-112.544	*
00NW10PC0004	UNNAMED CREEK	66.065	-112.704	*
00NW10PC0005	SOUTH CREEK UPSTREAM OF DRILLING AREA	66.011	-112.765	*
00NW10PC0006	SOUTH CREEK DOWNSTREAM OF DRILLING	66.043	-112.820	*
00NW10PC0007	KENDALL RIVER NEAR DISMAL LAKES	67.217	-116.525	*
00NW10PC0008	COPPERMINE RIVER AT BLOODY FALLS	67.733	-115.367	See note below
00NW10PC0009	MELVILLE CREEK NEAR THE MOUTH	67.267	-115.517	*
00NW10PC0010	COPPERMINE RIVER UPSTREAM OF MELVILLE	67.250	-115.550	*
00NW10PC0011	BIGTREE RIVER NEAR THE MOUTH	66.933	-116.350	*
00NW10PC0014	COPPERMINE RIVER 3.0KMS BELOW HEPBURN	65.850	-114.417	*
00NW10PC0015	HEPBURN RIVER NEAR THE MOUTH	65.833	-114.417	*
00NW10PC0016	AMOOGA BOOGA LAKE	66.079	-112.721	*
00NW10PC0017	ECSTALL LAKE	66.072	-112.654	*
00NW10PC0018	COPPERMINE RIVER	-	-	*

[Brackets] indicate naming corrections in the data set.

* These sites have only one or two samples or just field data.

Note: No data for 10PC0008 on latest disk but some data in Coppermine River study

Table 6. MISCELLANEOUS WATER QUALITY SITES IN THE COPPERMINE RIVER BASIN (DIANC

SITE ID	SITE NAME	LATITUDE	LONGITUDE	SAMPLE DATES
HCR-1	Lac de Gras	64.607	-109.920	Aug 1999
HCR-2	Lac de Gras	64.604	-110.134	Aug 1999
HCR-3	Lac de Gras	64.559	-110.019	Aug 1999
HCR-4	Lac de Gras	64.552	-110.073	Aug 1999
HCR-5	Lac de Gras	64.440	-110.152	Aug 1999
HCR-6	Lac de Gras	64.461	-110.278	Aug 1999
HCR-7	Lac de Gras	64.448	-110.398	Aug 1999
HCR-8	Lac de Gras	64.416	-110.300	Aug 1999
HCR-9	Lac de Gras	64.402	-110.651	Aug 1999
HCR-10	Lac de Gras	64.583	-110.424	Aug 1999
HCR-11	Lac de Gras	64.537	-110.330	Aug 1999
HCR-12	Lac de Gras	64.570	-110.628	Aug 1999
HCR-13	Lac de Gras	64.548	-110.998	Aug 1999 & Aug 2000
HCR-14	Lac de Gras Outflow	64.580	-111.233	Aug 1999
HCR-15	Desteffany Inflow	64.583	-111.581	Aug 1999 & Aug 2000
HCR-16	Desteffany Outflow	64.628	-111.859	Aug 1999 & Aug 2000
HCR-17	Lake Providence Inflow	64.640	-111.945	Aug 1999 & Aug 2000
HCR-18	Lake Providence Outflow	64.891	-112.337	Aug 1999 & Aug 2000
HCR-19	Point Lake Inflow	64.949	-112.329	Aug 1999 & Aug 2000
HCR-20-1 (2m)	Point Lake Outflow	65.386	-114.038	Aug 2000
RR0-1	Red Rock Outflow	65.535	-114.370	Aug 2000
RNO-1 (2m)	Rock Nest Outflow	65.664	-114.122	Aug 2000
NAP	Napaktolic River Inflow	65.679	-114.128	Aug 2000
HEP-1	Hepburn River Inflow	65.850	-114.397	Aug 2000
WS 2	Whitesandy River Inflow	66.117	-114.248	Aug 2000
CREEK-1	Noname Creek Inflow	66.697	-115.170	Aug 2000
HOOK R	Hook River Inflow	66.800	-116.207	Aug 2000
KDR-1	Kendal River Inflow	67.129	-116.110	Aug 2000
MCR	Melville Creek Inflow	67.282	-115.549	Aug 2000
BFU	Upstream Bloody Falls	67.711	-115.419	Aug 2000
BFD-1	Downstream Bloody Falls	67.745	-115.371	Aug 2000
CRM	At the Mouth	67.798	-115.109	Aug 2000
DES	Desteffany	-	-	Aug 2000
WSR-1	N/A	66.053	-114.321	Aug 2000

Only one or two samples taken for each site above

Parameters for samples include: ICP Mass Spectroscopy 23 Metal Scan, Nutrients and Routine Analysis

Coppermine River Drainage Basin Hydrometeorological Networks



