Mercury Content of Soil, Lake Sediment, Net Plankton, Vegetation, and Forage Fish in the Area of the Churchill River Diversion, Manitoba, 1981-82

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MERCURY CONTENT OF SOIL, LAKE SEDIMENT, NET PLANKTON, VEGETATION, AND FORAGE FISH IN THE AREA OF THE CHURCHILL RIVER DIVERSION, MANITOBA, 1981-82

by

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ABSTRACT

Bodaly, R.A., N.E. Strange, R.E. Hecky, R.J.P. Fudge, and C. Anema. 1987. Mercury content of soil, vegetation, lake sediment, net plankton and forage fish in the area of the Churchill River diversion, Manitoba, 1981-82. Can. Data Rep. Fish. Aquat. Sci. 610: iv + 33 p.

This study was undertaken to determine possible relationships between background (soil, sediment and vegetation) mercury concentrations, forage fish mercury levels, the amount of depletion of mercury in flooded soil and associated limnological parameters at various sites on and near the Churchill River diversion, northern Manitoba. In 1981, 13 sites (11 flooded, 2 unflooded) were sampled for sediment, flooded and unflooded soil, populations of small fish and limnological parameters. In 1982, seven sites (five flooded, two unflooded) were sampled for flooded and unflooded soil and populations of small fish. This report presents data for the mercury concentrations in these samples and some correlation coefficients between various quantities.

Key words: mercury; reservoirs (water); flooding; soils; moss; vegetation; sediments; spottail shiner; limnology; pH; chlorophyll; temperature (water); primary productivity; oxygen; dissolved ions.

RÉSUMÉ

Bodaly, R.A., N.E. Strange, R.E. Hecky, R.J.P. Fudge, and C. Anema. 1987. Mercury content of soil, vegetation, lake sediment, net plankton and forage fish in the area of the Churchill River diversion, Manitoba, 1981-82. Can. Data Rep. Fish. Aquat. Sci. 610: iv + 33 p.

Cette étude a été entreprise en vue de déterminer les rapports qui pourraient exister entre les concentrations de mercure de fond (sol, sédiment et végétation) le niveau de mercure dans le poisson alimentaire, la quantité de mercure que libèrent les sols inondés et les paramètres limnologiques s'y rapportant à divers endroits dans le nouveau cours du Churchill, dans le nord du Manitoba, et dans se environs immédiats. En 1981, il y a eu dans 13 lieux (11 inondés et 2 non inondés) prélèvement de sédiments, de terre dans des endroits inondés et non inondés, de sujets parmi les populations de petits poissons et contrôle des paramètres limnologiques. En 1982, il y a eu prélèvement d'échantillons de terredans des endroits inondés et non inondés ainsi que de sujets parmi les population de petits poissons dans sept lieux (5 inondés et 2 non inondés). Ce rapport présente les données sur les concentrations de mercure dans ces échantillons et des coefficients de corrélation entre diverses valeurs.

Mots-clés: mercure; réservoirs (d'eau); inondation; sols; mousse; végétation; sédiments; queue à tache noire; limnologie; pH; chlorophylle; température de l'eau; productivité primaire; oxygène; ions dissous.

INTRODUCTION

High levels of mercury in commercially important fish species were first noted in lakes flooded by the Churchill River hydroelectric project in northern Manitoba in late 1978. It was later demonstrated, for two of the lakes flooded for which both pre- and postimpoundment fish mercury data were available, that mercury levels in fish had risen coincidentally with flooding (Bodaly and Hecky 1979). The link between recently impounded reservoirs and high mercury levels in fish has recently been made in many areas (Abernathy and Cumbie 1977; Bruce and Spencer 1979; Cox et al. 1979; Potter et al. 1975; Waite et al. 1980; Lodenius et al. 1983).

An apparent relationship between the proportion of new reservoir surface area to flooded area and fish mercury levels was noted for lakes in the area of the Churchill River diversion by Bodaly et al. (1984a). This observation lead to the hypothesis that high mercury levels in fish in new reservoirs were due to the bacterial methylation of naturally occurring mercury found in flooded soils (Bodaly et al. 1984a). Cox et al. (1979) demonstrated an apparent depletion of soil mercury coincidentally with declining mercury levels in fish in an Illinois impoundment, implying that the amount of mercury available in flooded soils in reservoirs may be an important factor in determining mercury levels in fish. Abernathy and Cumbie (1977), while noting that flooded soils do provide an increased source of mercury to new reservoirs, hypothesized that declines in mercury levels in fish as reservoirs age may be related to the trophic state of the reservoir.

It is the purpose of this report to present data on mercury concentrations in forage fish, sediment, flooded and unflooded soil, vegetation, and netplankton, and to present data concerning limnological measurements which were made in conjunction with sampling for mercury content. Sampling was conducted over the course of two years at a number of sites in the area of the Churchill River diversion in northern Manitoba. Two of the sampled sites were unflooded, while the remainder were all on flooded lakes. The sampling was conducted to test the following hypotheses: first, that mercury concentrations in small fish in flooded areas was elevated relative to unflooded areas; second, that soil mercury was demonstrably depleted in Churchill River diversion reservoirs about five years after inundation; third, that mercury concentrations in populations of small fish in Churchill River diversion reservoirs were related to background (soil and sediment) mercury levels; and, fourth, that mercury concentrations in populations of small fish were related to local limnological conditions.

MATERIALS AND METHODS

STUDY SITES

The Churchill River diversion project in northern Manitoba was implemented over the period 1974-1977. About 75% of the flow of this river (or 760 $m^3 \cdot s^{-1}$) was diverted into the Nelson River basin for power production on the lower Nelson. The point of diversion was Southern Indian Lake and the diverted water followed the courses of the Rat and Burntwood River valleys before joining the Nelson River. See Bodaly et al. (1984b) and Newbury et al. (1984) for more complete descriptions of this project.

In 1981, sampling was conducted at 23 sites in the area of the Churchill River diversion (Fig. 1). Sites were chosen to encompass a broad range of flooded environments over the Churchill River diversion area and seven of the sites were adjacent to open water stations at which limnological parameters had been monitored over the period 1974-1978 (Hecky et al. 1979). Two of the sites were on lakes unaffected by the diversion: Granville Lake (coded on tables as G), on the Churchill River upstream of water control effects; and, East Mynarski Lake (EM), the eastern-most of a chain of three lakes located on a small tributary stream of the Rat River. Five sites were on Southern Indian Lake, which was raised 3 m in 1976 for the diversion of the Churchill River; Area 5 (5), Area 4 (4), Sandhill Bay (SA), Area 6 (South Bay) (6), and Wupaw Bay (WB). Five sites were part of the Notigi Reservoir in the Rat River valley, between Southern Indian Lake and the Notigi control structure. This reservoir flooded several lakes in the Rat River valley by 7-15 m over the period 1974-76: Issett Lake (I), on the upper Notigi Reservoir and raised by 7.6 m; Central Mynarski Lake (CM), the middle lake on the Mynarski chain, raised by 6.9 m; West Mynarski Lake (WM), the western-most lake on the Mynarski chain, raised by 9.0 m; the west basin of Notigi Lake (NW), and, the east basin of Notigi Lake (NE), both raised 15.2 m. One site was located on Footprint Lake (F), located on the Footprint River and flooded by 3.6 m as a result of the diverted Churchill River flows downstream of the Notigi control structure.

In 1982, sampling was conducted at seven sites (Fig. 1). Sites were chosen on the basis of the likelihood of concentrations of small fish and prevalence of mossy landscape. Six of the seven sites were on the same lake or lake basin as 1981 sites, but the precise locations usually differed from 1981; these six sites were Granville Lake, East Mynarski Lake, Area 5, Area 4, West Mynarski Lake, and Notigi Lake west basin. An additional site on Southern Indian Lake, Methyl Bay (MB), was added in 1982. Some additional spottail shiner samples were taken at the Wupaw Bay, Area 6 and Notigi Lake east basin sites.

In both years, a site was considered to consist of approximately 200 m of shoreline and adjacent areas of flooded shore (where present) and original lake bottom.

SOIL AND VEGETATION SAMPLING

Sample cores of flooded and unflooded soil were taken with modified cork borers (or similar aluminum piping) with diameters of 2.8 cm and lengths of 4 cm. The borers were fitted with plungers or pistons for core removal. The core samples were removed intact from the corer and stored frozen until analysis. Because of differences in the density of soil and moss materials cored, the actual depth of cores was variable.

In 1981, six samples were taken from each of unflooded soil, flooded soil (where present) and original lake sediment. Samples were taken at regularly spaced intervals along the length of each site.

In 1982, a set of 10 samples of unflooded soil and flooded soil (where present) was taken at each site. Each set of soil cores was taken within a small (10 m radius) area; unflooded and flooded soil samples were taken from adjacent areas. All cores were frozen within three days of recovery.

In the laboratory, frozen cores were thawed prior to separation into component soil horizon layers. A complete soil core was typically composed of three layers:

1. Moss/peat/litter - usually live green moss and/or brownish moss, sometimes lichen or broadleaf litter; structure of materials in this layer was generally distinguishable.

2. Ah horizon - brown or black colored humic rich soil horizon; vegetative structure not distinguishable.

3. Clay - brownish or gray predominately clay subsoil; sometimes contained some humus.

Not all layers were present in all cores. In particular, the clay layer was missing where the upper two layers were quite thick and the corer did not penetrate below the Ah horizon. Also, the upper moss/peat/litter layer had sometimes been eroded away by wave action from flooded soil cores.

In 1982, cores were separated into component layers according to naturally occurring divisions, as given above. In 1981, the top 2 cm of each core was removed as the first subsample; subsequent subsamples were taken according to naturally occurring divisions.

In 1981, six replicate lake sediment samples were taken at each site in a regular series adjacent to each paired sample of flooded and unflooded soil. Sediment samples were obtained using an Ekman dredge. A core was taken from the intact dredge sample to a depth of approximately 4.7 cm using a modified 50 cc disposable syringe.

Samples of representative vegetation were collected in July, 1976, as part of a study to estimate the biomass of vegetation to be flooded. Seven sites were sampled in Wupaw Bay, Southern Indian Lake (Fig. 1). The sites were chosen to represent the range of topographies, subsoils and vegetation covers that were inundated by the impoundment of Southern Indian Lake. The samples were dried after collection and subsequently analyzed for mercury content in February, 1983.

Sediment, vegetation, netplankton and soil subsamples were dried to constant weight at 100 C and then ground to a fine powder in a sample mill. Digestion of sediment and soil samples was carried out following the aqua regia procedure of Dow Chemical Co. of Canada Ltd. (Method CAS-AM-70.13). Vegetation and netplankton digestions used the potassium permanganate solution (Armstrong and Uthe 1971) to insure complete oxidation of organic matter. Total mercury content was determined by the atomic absorption spectrophotometry method of Armstrong and Uthe (1971). The analytical precision of total mercury determinations on dried material is ±0.024 at 0.6 $\mu g \cdot g^{-1}$ Hg and is ±0.010 at 0.1 $\mu g \cdot g^{-1}$ Hg while the detection limit is 0.005 $\mu g \cdot g^{-1}$.

FISH SAMPLING

Samples of small fish were collected in shallow water at each site using a seine net pulled by hand. An attempt was made to collect at least one dozen spottail shiners and one dozen yellow perch, of similar sizes, at each site. Fish were placed in plastic bags and iced immediately after capture. Samples were frozen within two days of capture and stored frozen for 2-4 months before examination. Total length was determined on frozen fish to the nearest mm. While still frozen, the body musculature was removed from both sides of each fish. Mercury concentration in the musculature was determined by the atomic absorption spectrophotometry method of Armstrong and Uthe (1971). The analytical precision of total mercury determinations on fish muscle is ±0.008 at 0.10 $\mu g \cdot g^{-1}$ Hg while the detection limit is 0.005 $\mu g \cdot g^{-1}$.

In 1981, spottail shiners collected at 12 sites ranged in size from 26 to 106 mm total length. The mercury concentration values for individual fish were adjusted for fish size using the analysis of covariance procedure of Dixon and Massey (1969). The within groups regression line was calculated using log total length (mm) as the independent variable and log total mercury concentration ($\mu g \cdot g^{-1}$ wet weight) as the dependent variable. The residuals from this line were utilized as a measure of the mercury content for individual fish. Yellow perch collected in 1981 were similar in size among sites, ranging in mean total length from 46 to 66 mm and mercury concentration was therefore not adjusted for fish size for these samples. Similarly, the mercury content of spottail shiners and yellow perch taken in 1982 was not adjusted to fish size. Spottail shiners taken from 10 of the sites in 1982 ranged in mean total length from 70 to 81 mm while yellow perch from 7 of the sites ranged in mean total length from 62 to 75 mm.

LIMNOLOGICAL SAMPLING

In 1981, a series of physical, chemical and biological parameters were determined at a station offshore of each soil sampling site (depth usually ≈5 m) three times over the open water season. Sample periods were: 1) 18-20 June, 2) 20-25 July, and 3) 17-24 August. The following parameters were determined: mean temperature of the water column (to 5 m depth) (TEMP), total dissolved nitrogen (TDN), total dissolved phosphorus (TDP), total suspended solids (TSS), suspended phosphorus (SP), suspended nitrogen (SN), suspended carbon (SC), dissolved organic carbon (DOC), percent oxygen saturation (SAT), oxygen consumption in the water column (RESP), water conductivity (COND), water column light absorbance at 455 nm after filtration and centrifugation (ABS), absorbances at 543 nm of the unfiltered sample (UNFILT), the filtered sample (FILT), and filtered/centrifuged sample (CENT), rate of primary productivity (PROD), and total mercury concentration in the zooplankton fractions >73 µm (Z73), >153 µm(Z153), >351 µm (Z351) and >760 µm (Z760). In Tables 16 and 17, values for each parameter are presented for individual sampling times (denoted as the parameter code followed by 1, 2 or 3) and for the mean of the three sample times (denoted by the parameter code preceeded by M). For water column light absorbance measurements taken at 543 nm, correlations were calculated using the change in absorbance from the unfiltered sample, UNFILT, to the filtered sample, FILT (ΔFILT) and using the change in absorbance from the unfiltered sample, UNFILT, to the filtered/centrifuged sample, CENT, (ΔCENT).

Field sampling

Temperature and conductivity profiles from surface to bottom were made using a Montedoro-Whitney model CTU-3A temperature-conductivity meter. The mean depth of appearance and disappearance of a 25 cm Secchi disk divided into alternating black and white quadrants was also recorded. Water samples for chemical analyses and primary productivity estimates were taken with a sampler (Fee 1976) which integrated between the surface and five meters depth. The water samples were taken directly into opaque polypropylene two liter bottles and stored in insulated coolers until processing at the laboratory at the South Indian Lake research station. Light extinction profiles required for the calculation of integral primary productivity were measured as described in Hecky (1984) using a Li-Cor Instruments underwater quantum sensor and meter. Two sets of twin Nitex Wisconsin nets (described by Patalas and Salki (1984)) were towed horizontally for a minimum of three minutes (longer if plankton were sparse) to collect a sufficient quantity of plankton for mercury analysis. Four different mesh sizes were used (73, 153, 351, and 760 µm) in order to sample differentially the larger components of the plankton community. The plankton samples were transferred to glass jars and stored on ice until further processing at the laboratory.

Laboratory analyses

The netplankton samples were poured onto a 10 µm mesh sieve to drain off excess water, and they were then harvested from the sieve surface into 20 mL polyethylene scintillation vials. The vials were then stored frozen until analysis for mercury content at the Freshwater Institute. Integral primary productivity (PROD) was measured using the incubator-based, numerical integration method of Fee (1973) as applied by Hecky and Guildford (1984).

Unfiltered water was used for the analysis of pH, oxygen and dissolved inorganic carbon (DIC) while filtered and centrifuged water was used for the anlaysis of NH_4^+-N. The procedures used were those of Stainton et al. (1977). Oxygen titrations were performed using an amperometric end point. The reagents for the oxygen analysis were described by Carpenter (1965). Oxygen consumption estimates (RESP) are based on two replicate initial measurements which also serve for the percent saturation estimates (SAT) and two final replicate measurements made after incubation in the dark at ambient temperatures for approximately 24 h. Oxygen consumption rates are expressed on an hourly basis.

Water samples for analysis by the Analytical Unit of the Freshwater Institute in Winnipeg were filtered through GFC glass-fiber filters and then centrifuged. Absorbance at 543 nm was measured in 10 cm cells on a Bausch and Lomb model Spectronic 70 spectrophotometer before filtration, after filtration and after centrifugation to allow estimation of suspended particulate matter. After centrifugation absorbance was measured at 455 µm for humic color (Guildford 1984). For all absorbance measurements distilled deionized water served as the reference. Suspended carbon and nitrogen were analyzed from one filter while suspended phosphorus, total suspended solids and chlorophyll were analyzed from separate filters using the methods of Stainton et al. (1977). Filtered and centrifuged water was subsampled into 20 mL plastic vials for analysis of cations (preserved with 200 mL of 1 N CHl) and into 20 mL glass vials for the analysis of DOC, (preserved with 50 µL saturated $HgCl_2$) and TDN and TDP (preserved with 100 µL of 4 N H_2SO_4). Analysis methods followed Stainton et al. (1977).

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REFERENCES

ABERNATHY, A.R., and P.M. CUMBIE. 1977. Mercury accumulation by largemouth bass (Micropterus salmoides) in recently impounded reservoirs. Bull. Environ. Contam. Toxicol. 17(5): 595-602.

ARMSTRONG, F.A.J., and J.F. UTHE. 1971. Semi-automated determination of mercury in animal tissue. At. Absorpt. Newsl. 10: 101-103.

BODALY, R.A., and R.E. HECKY. 1979. Post-impoundment increases in fish mercury levels in the Southern Indian Lake reservoir, Manitoba. Can. Fish. Mar. Serv. Manuscr. Rep. 1531: iv + 15 p.

BODALY, R.A., R.E. HECKY, and R.J.P. FUDGE. 1984a. Increases in fish mercury levels in lakes flooded by the Churchill River diversion, northern Manitoba. Can. J. Fish. Aquat. Sci. 41: 682-691.

BODALY, R.A., D.M. ROSENBERG, M.N. GABOURY, R.E. HECKY, R.W. NEWBURY, and K. PATALAS. 1984b. Ecological effects of hydroelectric development in northern Manitoba, Canada: The Churchill-Nelson River diversion, p. 273-310. In P.J. Sheehan, D.R. Miller, G.C. Butler and Ph. Bourdeau (ed.) Effects of pollutants at the ecosystem level. John Wiley and Sons, Chichester. (SCOPE 22).

BRUCE, W.J., and D. SPENCER. 1979. Mercury levels in Labrador fish, 1977-78. Can. Ind. Rep. Fish. Aquat. Sci. 111: iv + 12 p.

CARPENTER, J.H. 1965. The Chesapeake Bay Institute technique for the Winkler dissolved oxygen method. Limnol. Oceanogr. 10: 141-143.

COX, J.A., J. CARNAHAN, J. DINUNZIO, J. MCCOY, and J. MEISTER. 1979. Source of mercury in fish in new impoundments. Bull. Environ. Contam. Toxicol. 23: 779-783.

DIXON, W.J., and F.J. MASSEY. 1969. Introduction to statistical analysis. McGraw-Hill, New York.

FEE, E.J. 1973. Modelling primary production in water bodies: a numerical approach that allows for vertical inhomogeneities. J. Fish. Res. Board Can. 30: 1469-1473.

FEE, E.J. 1976. The vertical and seasonal distribution of chlorophyll in lakes of the Experimental Lakes Area, northwestern Ontario: implications for primary productivity estimates. Limnol. Oceanogr. 21: 767-783.

GUILDFORD, S.J. 1984. Depression of primary productivity by suspended sediment and dissolved humic material in limnocorral experiments at Southern Indian Lake, northern Manitoba. M.Sc. thesis, University of Manitoba, Winnipeg, MB. 191 p.

HECKY, R.E. 1984. Thermal and optical characteristics of Southern Indian Lake before, during and after impoundment and Churchill River diversion. Can. J. Fish. Aquat. Sci. 41: 579-590.

HECKY, R.E., and S.J. GUILDFORD. 1984. Primary productivity of Southern Indian Lake before, during, and after impoundment and Churchill River diversion. Can. J. Fish. Aquat. Sci. 41: 591-604.

HECKY, R.E., J. ALDER, C. ANEMA, K. BURRIDGE, and S.J. GUILDFORD. 1979. Physical data on Southern Indian Lake, 1974 through 1978, before and after impoundment and Churchill River diversion. Can. Fish. Mar. Serv. Data Rep. 158: iv + 523 p. (In two parts)

LODENIUS, M., A. SEPANEN, and M. HERRANEN. 1983. Accumulation of mercury in fish and man from reservoirs in northern Finland. Water Air Soil Pollut. 19: 237-246.

NEWBURY, R.W., G.K. McCULLOUGH, and R.E. HECKY. 1984. The Southern Indian Lake impoundment and Churchill River diversion. Can. J. Fish. Aquat. Sci. 41: 548-557.

PATALAS, K., and A. SALKI. 1984. Effects of impoundment and diversion on the crustacean plankton of Southern Indian Lake. Can. J. Fish. Aquat. Sci. 41: 613-637.

POTTER, L., D. KIDD, and D. STANDIFORD. 1975. Mercury levels in Lake Powell. Bioamplification of mercury in man-made desert reservoirs. Environ. Sci. Technol. 9(1): 41-46.

STAINTON, M.P., M.J. CAPEL, and F.A.J. ARMSTRONG. 1977. Chemical analysis of freshwater. 2nd ed. Can. Fish. Mar. Serv. Misc. Spec. Publ. 25: 166 p.

WAITE, D.T., G.W. DUNN, and R.J. STEDWILL. 1980. Mercury in Cookson Reservoir (East Poplar River). Sask. Environ. Wat. Pollut. Control Branch W.P.C. 23: 19 p.

Table 1. Concentration of total mercury in upper 2 cm of unflooded soil (regardless of actual composition) from 13 sites in the area of the Churchill River diversion, 1981.

Site		mean total Hg conc. ($\mu g \cdot g^{-1}$ dry wt)	n	SD
5	(SIL* Area 5)	0.099	6	0.019
4	(SIL Area 4)	0.109	6	0.049
SA	(SIL Sandhill Bay)	0.110	6	0.045
WB	(SIL Wupaw Bay)	0.114	6	0.029
6	(SIL Area 6)	0.083	7	0.027
I	(Issett Lake)	0.057	6	0.036
G	(Granville Lake)	0.119	6	0.085
WM	(West Mynarski Lake)	0.115	6	0.029
CM	(Central Mynarski Lake)	0.085	6	0.018
EM	(East Mynarski Lake)	0.055	6	0.047
NW	(Notigi Lake, West basin)	0.052	6	0.046
NE	(Notigi Lake, East basin)	0.169	6	0.074
F	(Footprint Lake)	0.079	9	0.035

* SIL = Southern Indian Lake

Table 2. Concentration of total mercury in unflooded soil horizons from 13 sites in the area of the Churchill River diversion, 1981.

Horizon	Site*	Mean total Hg ($\mu g \cdot g^{-1}$ dry wt)	n	SD
moss/peat/litter	5	0.099	6	0.019
	4	0.109	6	0.049
	SA	0.110	6	0.045
	WB	0.114	4	0.027
	6	0.083	6	0.028
	I	0.057	6	0.036
	G	0.119	7	0.078
	WM	0.115	6	0.029
	CM	0.085	6	0.018
	EM	0.055	6	0.047
	NW	0.052	6	0.046
	NE	0.169	3	0.113
	F	0.079	9	0.035
Ah	5	0.115	5	0.019
	4	0.126	6	0.051
	SA	0.110	6	0.011
	WB	0.093	4	0.021
	6	0.102	4	0.009
	I	0.021	5	0.020
	G	0.080	6	0.050
	WM	0.113	3	0.032
	CM	0.108	2	0.016
	EM	0.021	4	0.023
	NW	0.100	2	0.057
	NE	0.165	4	0.037
	F	0.127	3	0.051
clay	5	0.022	2	0.012
	4	0.035	1	-
	SA	0.030	1	-
	WB	0.056	5	0.026
	6	0.027	6	0.009
	I	0.027	4	0.015
	G	0.027	3	0.015
	WM	0.050	5	0.026
	CM	0.028	6	0.008
	EM	0.033	4	0.021
	NW	0.038	6	0.031
	NE	0.035	6	0.012
	F	0.037	9	0.014

* See Table 1 for key.

Table 3. Concentration of total mercury in unflooded soil horizons from 7 sites in the area of the Churchill River diversion, 1982.

Horizon	Site		Mean total Hg ($\mu g \cdot g^{-1}$ dry wt)	n	SD
moss/peat/litter	5	(SIL Area 5)	0.115	12	0.048
	4	(SIL Area 4)	0.068	11	0.015
	MB	(SIL Methyl Bay)	0.104	10	0.021
	G	(Granville Lake)	0.156	10	0.051
	EM	(East Mynarski Lake)	0.062	5	0.014
	WM	(West Mynarski Lake)	0.207	3	0.025
	NW	(Notigi Lake West basin)	0.069	7	0.013
Ah	5		0.174	8	0.063
	4		0.075	8	0.017
	MB		0.081	10	0.012
	G		0.165	10	0.049
	EM		0.094	10	0.022
	WM		0.153	3	0.015
	NW		0.075	10	0.020
clay	5			-	
	4			-	
	MB		0.013	3	0.002
	G			-	
	EM		0.045	8	0.017
	WM		0.037	10	0.022
	NW			-	

Table 4. Concentration of total mercury in sediment samples from 13 sites in the area of the Churchill River diversion, 1981.

Site*	Mean total Hg ($\mu g \cdot g^{-1}$ dry wt)	n	SD
5	0.017	6	0.004
4	0.009	6	0.002
SA	0.014	6	0.002
WB	0.053	6	0.006
6	0.045	6	0.004
I	0.050	6	0.010
G	0.024	6	0.017
WM	0.058	6	0.013
CM	0.015	6	0.010
EM	0.020	6	0.003
NW	0.028	6	0.019
NE	0.014	6	0.003
F	0.060	6	0.004

* See Table 1 for key.

Table 5. Concentration of total mercury in flooded soil horizons from 11 sites in the area of the Churchill River diversion, 1981.

Horizon	Site*	Mean total Hg ($\mu g \cdot g^{-1}$ dry wt)	n	SD
moss/peat/litter	5	0.083	3	0.020
	4	0.067	1	-
	SA	0.088	3	0.030
	I	0.100	1	-
	NW	0.080	1	-
	F	0.094	3	0.015
Ah	5	0.060	4	0.027
	4	0.078	4	0.012
	SA	0.072	5	0.023
	WB	0.071	3	0.022
	6	0.084	6	0.028
	I	0.078	5	0.033
	WM	0.090	5	0.021
	CM	0.051	5	0.010
	NW	0.061	5	0.014
	NE	0.098	5	0.036
	F	0.073	6	0.018
clay	4	0.043	2	0.013
	SA	0.022	3	0.009
	WB	0.041	5	0.015
	6	0.035	6	0.013
	I	0.025	4	0.007
	WM	0.031	5	0.014
	CM	0.026	6	0.008
	NW	0.016	5	0.002
	NE	0.026	4	0.007
	F	0.032	9	0.021

* See Table 1 for key.

Table 6. Concentration of total mercury in flooded soil horizons from five sites in the area of the Churchill River diversion, 1982.

Horizon	Site*	Mean total Hg ($\mu g \cdot g^{-1}$ dry wt)	n	SD
moss/peat/litter	5	0.158	9	0.036
	4	0.080	6	0.012
	MB	0.117	8	0.019
	WM	0.068	6	0.016
	NW	0.047	1	-
Ah	5	0.148	6	0.012
	4	0.064	5	0.010
	MB	0.130	10	0.024
	WM	0.089	9	0.019
	NW	0.069	10	0.022
clay	MB	0.082	2	0.054
	WM	0.034	8	0.012
	NW	0.031	9	0.006

* See Table 3 for key.

Table 7. Mercury, carbon, phosphorus and nitrogen content of unflooded vegetation from Wupaw Bay, Southern Indian Lake, 1976. Replicate analyses are given for some nitrogen determinations. See Fig. 1 for site locations.

Species	Part	Sample no.	Total Hg (μg·g⁻¹)	Carbon (μg·mg⁻¹)	Phosphorus (μg·mg⁻¹)	Nitrogen (μg·mg⁻¹)	Site	Identity	Height (m)	Diameter at 1.4 m (cm)	Description or sample location on tree
Picea mariana	wood	87	<0.005	514	0.09	0.51, 0.55	WB4	TK	2.2	2.2	•lower bole
		98	0.008	492	0.07	0.23, 0.41	WB1	T2	16.0	21.8	•bole at 8 m
	bark	88	0.019	542	0.21	1.54	WB4	TK	2.2	2.2	•lower bole
		100	0.023	521	0.32	2.37	WB1	T1	8.5	7.6	•bole at 0.1 m
		99	0.029	506	0.35	2.60, 2.34	WB2	T8	6.5	8.1	•branches at 1 to 1.2 m
	twigs	19	0.070	491	0.43	4.14	WB1	T4	2.8	2.9	•0 to 1 m
		20	0.039	502	0.59	3.87	WB1	T2	16.0	21.8	•7.8 to 8 m
		9	0.039	409	0.45	-	WB4	T16	4.7	4.8	-
	foliage	21	0.014	501	0.50	5.26	WB4	T15	2.0	1.9	•1 to 1.2 m
		22	0.012	453	0.68	4.20, 4.50	WB2	T8	6.5	8.1	•1 to 1.2 m
		24	0.065	457	0.66	5.11	WB1	T4	2.8	2.9	•0 to 1 m
		25	0.010	304	0.68	5.86	WB1	T1	8.5	7.6	•7 to 7.2 m
		23	0.010	462	0.69	5.63	WB1	T2	16.0	21.8	•7.8 to 8 m
		8	0.011	334	0.52	-	WB4	T16	4.7	4.8	-
Populus tremuloides	wood	94	<0.005	533	0.03	0.48	WB6	T30	10.6	12.4	•bole at 0.2 to 0.3 m
	bark	92	0.018	505	0.30	2.41, 2.67	WB5	T29	4.3	3.4	•bole at 0 to 0.2 m
		93	0.011	328	0.78	3.13	WB6	T30	10.6	12.4	•bole at 5 to 5.1 m
	twigs	30	0.014	491	0.48	5.66, 6.36	WB5	T29	4.3	3.4	•3 to 3.2 m
		32	<0.005	503	0.66	4.78	WB6	T30	10.6	12.4	•5 to 5.2 m

Table 7. Cont'd.

Species	Part	Sample no.	Total Hg ($\mu g \cdot g^{-1}$)	Carbon ($\mu g \cdot mg^{-1}$)	Phosphorus ($\mu g \cdot mg^{-1}$)	Nitrogen ($\mu g \cdot mg^{-1}$)	Site	Identity	Height (m)	Diameter at 1.4 m (cm)	Description or sample location on tree
Populus tremuloides	foliage	31	0.011	485	1.43	18.36	WB5	T29	4.3	3.4	•3 to 3.2 m
		33	0.013	486	1.73	17.58	WB6	T30	10.6	12.4	•5 to 5.2 m
		11	0.013	223	1.54	-	WB5	T28	7.2	7.8	-
Populus balsamifera	wood	84	0.005	459	0.21	2.05	WB11	T52	6.9	6.4	•bole at 2.7 m
	bark	85	0.018	499	0.84	5.14, 6.58	WB11	T52	6.9	6.4	•bole at 2.7 m
		86	<0.005	514	1.16	6.71	WB11	T51	10.6	13.3	•bole at 9.1 m
	twigs	60	0.014	463	1.08	5.76, 8.76	WB11	T52	6.9	6.4	•at 5.5 m
		62	0.014	492	0.79	4.64, 6.68	WB11	T52	6.9	6.4	•at 6.4 to 6.6 m
	foliage	61	0.020	443	2.38	3.41, 4.01	WB11	T52	6.9	6.4	•at 5.5 m
		63	0.023	442	2.40	5.71	WB11	T51	10.6	13.3	•6.4 to 6.6 m
		64	0.027	436	3.47	8.64, 9.92	WB11	T51	10.6	13.3	•8.2 to 8.4 m
Betula papyrifera	wood	91	0.015	333	0.13	0.77, 0.93	WB2	T1	8.5	9.4	•bole at 0.3 to 0.4 m
	bark	89	0.008	545	0.26	3.61	WB2	T2	5.5	5.4	•bole at 2 to 2.1 m
		90	0.005	560	0.31	2.80, 2.98	WB3	T12	6.4	6.2	•bole at 7.6 cm diameter
	twigs	50	0.034	490	0.37	1.85, 2.47	WB2	T2	5.5	5.4	•3 to 3.2 m
		52	0.024	484	0.56	1.44, 2.60	WB3	T12	-	-	•4.1 to 4.3 m
	foliage	51	0.012	463	1.49	6.67, 8.13	WB2	T2	5.5	5.4	•3 to 3.2 m
		53	0.016	479	1.09	4.89	WB3	T12	6.4	6.2	•4.1 to 4.3 m

Table 7. Cont'd.

Species	Part	Sample no.	Total Hg ($\mu g \cdot g^{-1}$)	Carbon ($\mu g \cdot mg^{-1}$)	Phosphorus ($\mu g \cdot mg^{-1}$)	Nitrogen ($\mu g \cdot mg^{-1}$)	Site	Identity	Height (m)	Diameter at 1.4 m (cm)	Description or sample location on tree
Pinus banksiana	wood	95	<0.005	489	0.02	0.38	WB3	T14	6.2	7.6	•bole at 2.6 to 2.7 m
	bark	97	0.018	552	0.19	2.04	WB3	T14	6.2	7.6	•bole at 1.5 to 2.5 m
		96	0.013	512	0.21	2.09	WB3	T14	6.2	7.6	•bole at 2.6 to 2.7 m
	twigs	27	0.012	520	0.48	3.99	WB3	T13	6.5	7.8	•3 to 3.2 m
		29	0.007	509	0.40	3.47	WB3	T14	6.2	7.6	•5 to 5.2 m
	foliage	26	<0.005	470	0.62	5.86	WB3	T13	6.5	7.8	•3 to 3.2 m
		28	<0.005	507	0.59	6.58	WB3	T14	6.2	7.6	•5 to 5.2 m
Salix sp.[a]	wood	81	<0.005	510	0.45	1.42, 1.84	WB4	W24.4	2.5	2.2	•large branch
			-	481	0.28	-	-	R	-	-	-
	bark	83	0.016	404	0.43	4.11, 4.83	WB2	T7	1.9	1.8	•bole near base
		82	0.012	497	0.75	9.8, 11.2	WB4	W24.4	2.5	2.2	•large branch
Salix sp.	twigs	57	<0.005	465	1.17	4.34, 5.20	WB4	W18	1.8	1.1	•0.5 m to top
Salix cordata		59	0.017	427	0.77	2.91, 5.45	WB2	T5	4.7	3.0	•2.5 m to top
Salix sp.	foliage	56	0.012	445	2.39	14.7, 24.3	WB4	W18	1.8	1.1	•0.5 m to top
		10	0.017	278	1.53	-	WB4	W19	3.1	2.2	-
		54	0.010	428	1.56	15.6, 26.2	WB4	W27.3	1.9	1.8	-
		55	0.012	385	2.85	15.6, 18.0	WB2	02.2	0.7	-	-
Salix cordata		58	0.012	430	1.86	6.78, 7.60	WB2	T5	4.7	3.0	•2.5 m to top

Table 7. Cont'd.

Species	Part	Sample no.	Total Hg ($\mu g \cdot g^{-1}$)	Carbon ($\mu g \cdot mg^{-1}$)	Phosphorus ($\mu g \cdot mg^{-1}$)	Nitrogen ($\mu g \cdot mg^{-1}$)	Site	Identity	Height (m)	Diameter at 1.4 m (cm)	Description or sample location on tree
Alnus sp.	wood	78	0.006	483	0.24	1.99, 2.85	WB2	05.3	2.7	-	•large branch
	bark	79	0.010	657	0.56	10.1	WB2	05.3	2.7	-	•large branch
		80	0.011	484	0.30	7.19, 8.29	WB3	02	-	-	•small branch
	twigs	75	0.013	536	1.50	6.02, 11.8	WB2	01.2	0.4	-	-
		76	0.014	518	1.00	12.5, 13.1	WB2	04.2	1.4	-	-
		65	0.016	505	0.74	9.2, 11.4	WB2	05.3	2.7	-	-
		67	0.012	524	0.37	7.68, 9.04	WB3	02	-	-	-
	foliage	3	0.010	316	1.68	-	WB2	05.3	-	-	-
		74	0.026	467	2.88	32.1	WB2	01.2	0.4	-	-
		77	0.018	443	1.57	28.5	WB2	04.2	1.4	-	-
		66	0.013	437	1.64	21.0, 25.6	WB2	05.2	2.2	-	-
		68	0.017	466	0.77	13.6, 21.0	WB3	02	-	-	-
Ledum groenlandicum	twigs	7	0.013	408	0.21	-	WB3	01	-	-	-
		70	0.023	538	0.56	5.12, 5.52	WB3	02	-	-	-
		71	0.015	469	0.50	4.78	WB4	07	-	-	-
	foliage	6	0.015	376	1.16	-	WB3	01	-	-	-
		69	0.015	531	1.29	13.9	WB3	02	-	-	-
		72	0.020	469	1.12	13.7	WB4	07	-	-	-
		73	0.022	265	1.02	12.7	WB4	05	-	-	-
Sphagnum spp.		12	0.034	328	0.53	-	WB7	02	-	-	-
		46	0.13	448	0.65	8.51	-	-	-	-	-
		47	0.054	428	0.48	4.73	WB1	015	-	-	-
		48	0.022	398	0.27	4.78	WB4	03	-	-	-
		49	0.047	411	0.34	2.05	WB4	03	-	-	-

Table 7. Cont'd.

Species	Part	Sample no.	Total Hg ($\mu g \cdot g^{-1}$)	Carbon ($\mu g \cdot mg^{-1}$)	Phosphorus ($\mu g \cdot mg^{-1}$)	Nitrogen ($\mu g \cdot mg^{-1}$)	Site	Identity	Height (m)	Diameter at 1.4 m (cm)	Description or sample location on tree
Feather mosses		42	0.093	411	0.91	6.32	WB1	Q8	-	-	-
		43	0.053	440	1.16	7.91	WB6	Q10	-	-	•green
		44	0.073	412	0.66	4.99, 5.33	WB4	-	-	-	-
		45	0.010	396	1.04	5.71	WB1	-	-	-	-
Litter and organic soil horizon		1	0.064	257	0.67	-	WB1	-	-	-	-
		4	0.083	195	1.00	-	WB2	Q1	-	-	-
			-	384	0.86	14.70	WB2	Q4	-	-	-
		35	0.046	446	0.89	16.01	WB2	Q5	-	-	-
		36	0.039	483	0.45	8.60	WB3	Q2	-	-	-
		37	0.058	481	0.66	8.87	WB6	-	-	-	-
		38	0.059	474	0.92	8.36	WB1	-	-	-	-
		39	0.093	449	0.67	9.96, 10.84	WB1	Q8	-	-	•dominately *Picea* twigs and feather mosses •with considerable feather mosses
			-	466	0.57	12.60	WB4	Q1	-	-	•no *Sphagnum*
		41	0.094	473	0.78	9.34	WB7	Q1	-	-	-

[a] *Salix* sp.: diameter measured at 0.5 m above base (except *Salix cordata*).

Table 8. Concentration of total mercury in spottail shiner muscle from 12 sites in the area of the Churchill River diversion, 1981.

Site*	n	Mean total mercury conc ($\mu g \cdot g^{-1}$)	(range)	Mean total length of fish sample (mm)	(range)	Residual from "within groups" regression of log [Hg] vs length	(SD)
5	12	0.38	(0.27-0.46)	94.1	(88-106)	+0.333	(0.064)
4	9	0.19	(0.16-0.25)	47.4	(40-56)	+0.186	(0.085)
SA	8	0.12	(0.11-0.14)	65.9	(60-71)	-0.076	(0.045)
WB	12	0.06	(0.05-0.07)	47.2	(40-62)	-0.315	(0.065)
6	12	0.13	(0.07-0.19)	51.5	(44-59)	-0.004	(0.128)
G	12	0.06	(0.05-0.08)	42.2	(40-45)	-0.282	(0.057)
WM	10	0.14	(0.09-0.23)	81.6	(73-87)	-0.083	(0.110)
CM	12	0.13	(0.11-0.18)	79.0	(74-85)	-0.084	(0.066)
EM	9	0.08	(0.06-0.11)	54.3	(44-71)	-0.218	(0.071)
NW	8	0.18	(0.16-0.20)	30.6	(29-32)	+0.259	(0.034)
NE	8	0.19	(0.17-0.24)	29.0	(26-31)	+0.294	(0.061)
F	18	0.17	(0.08-0.26)	60.9	(37-80)	+0.085	(0.102)

* See Table 1 for key.

Table 9. Concentration of total mercury in yellow perch muscle from seven sites in the area of the Churchill River diversion, 1981.

Site*	n	Mean total mercury conc ($\mu g \cdot g^{-1}$) (range)		Mean total length of fish sample (mm) (range)	
5	8	0.08	(0.03-0.18)	49.0	(38-65)
I	12	0.05	(0.03-0.07)	60.2	(55-65)
G	8	0.03	(0.02-0.04)	66.0	(58-90)
WM	12	0.07	(0.06-0.11)	53.5	(48-59)
CM	12	0.08	(0.06-0.10)	55.8	(51-60)
EM	12	0.03	(0.03-0.04)	46.0	(42-55)
F	24	0.15	(0.10-0.18)	55.2	(47-60)

* See Table 1 for key.

Table 10. Concentration of total mercury in spottail shiner muscle from 10 sites in the area of the Churchill River diversion, 1982.

Site*	n	Mean total mercury conc ($\mu g \cdot g^{-1}$) (range) (SD)			Mean total length of fish sample (mm) (range)	
5	12	0.15	(0.12-0.20)	(0.02)	70.2	(64-80)
4	12	0.15	(0.09-0.21)	(0.04)	72.3	(60-79)
MB	12	0.11	(0.05-0.16)	(0.03)	71.2	(66-79)
WB	5	0.10	(0.09-0.11)	(0.01)	81.2	(67-93)
6	12	0.10	(0.07-0.15)	(0.02)	72.7	(65-84)
G	12	0.05	(0.03-0.07)	(0.01)	74.2	(68-79)
WM	12	0.15	(0.11-0.20)	(0.03)	74.6	(66-86)
EM	12	0.05	(0.03-0.06)	(0.01)	70.8	(63-79)
NW	12	0.19	(0.16-0.24)	(0.02)	75.1	(71-80)
NE	12	0.24	(0.12-0.32)	(0.06)	76.2	(72-81)

* See Table 3 for key.

Table 11. Concentration of total mercury in yellow perch muscle from seven sites in the area of the Churchill River diversion, 1982.

Site*	n	Mean total mercury conc ($\mu g \cdot g^{-1}$) (range) (SD)			Mean total length of fish sample (mm) (range)	
5	12	0.09	(0.06-0.13)	(0.02)	62.3	(58-70)
4	7	0.11	(0.08-0.15)	(0.03)	64.3	(62-70)
MB	12	0.06	(0.03-0.11)	(0.02)	62.5	(58.72)
G	12	0.02	(0.01-0.03)	(0.01)	71.1	(65-77)
WM	12	0.11	(0.06-0.27)	(0.06)	65.5	(57-72)
EM	12	0.02	(0.01-0.04)	(0.01)	74.8	(64-81)
NW	12	0.18	(0.14-0.25)	(0.04)	65.7	(64-70)

* See Table 3 for key.

Table 12. Major dissolved constituents at 1981 sampling sites; Na, K, Ca, Mg, Cl, SO_4, dissolved inorganic carbon (DIC), pH and specific conductance (COND) at 13 sites in the area of the Churchill River diversion, 1981. The analytical number (Anal #) is an internal reference number.

Location	Date	Anal#	Na	K	Ca	Mg	Cl	SO_4	DIC	pH	COND
						µm/L					µS/cm
G	19-Jun	35	84	21.3	179	92	35	242	576	NA	112
	25-Jul	111	96	24.4	171	98	20	36	686	7.83	66
	18-Aug	207	107	24.3	185	108	17	80	585	8.01	68
MEAN			96	23.4	179	100	24	119	616	7.92	82
6	19-Jun	33	101	22.4	216	116	25	39	747	NA	83
	25-Jul	113	105	26.5	251	121	23	36	952	8.08	85
	18-Aug	208	101	23.8	248	121	20	39	772	8.08	83
MEAN			102	24.2	238	119	23	38	824	8.08	84
4	19-Jun	31	89	20.8	377	152	NA	NA	1130	NA	122
	25-Jul	109	92	22.8	364	152	20	36	1310	8.12	116
	18-Aug	205	79	19.8	375	160	11	61	987	8.17	116
MEAN			86	21.1	372	155	16	49	1142	8.15	118
5	19-Jun	30	61	16.7	327	141	23	32	992	NA	100
	25-Jul	108	70	17.4	311	135	17	36	1050	7.86	94
	18-Aug	204	69	18.7	335	154	17	35	780	7.97	102
MEAN			67	17.6	325	143	19	35	941	7.92	99
SA	19-Jun	32	44	17.2	243	98	28	36	679	NA	76
	25-Jul	110	64	20.3	282	119	14	37	944	7.80	88
	18-Aug	206	68	19.2	314	133	11	72	734	8.18	95
MEAN			59	18.9	280	117	18	49	786	7.99	86

Table 12. Cont'd.

Location	Date	Anal#	Na	K	Ca	Mg	Cl	SO_4	DIC	pH	COND
			µm/L								µS/cm
NW	18-Jun	24	103	23.4	253	129	28	37	860	NA	87
	24-Jul	107	106	25.2	235	117	25	35	807	NA	85
	17-Aug	195	107	23.2	264	131	20	40	812	8.08	84
MEAN			105	24.0	251	126	24	37	826	NA	85
NE	18-Jun	25	101	22.9	280	131	11	229	962	NA	112
	24-Jul	106	108	26.5	251	123	23	37	845	NA	85
	17-Aug	196	109	23.2	245	125	20	39	783	8.13	84
MEAN			106	24.2	259	126	18	102	863	NA	94
F	18-Jun	26	88	25.5	536	200	11	233	1560	NA	160
	24-Jul	105	103	28.1	530	204	20	45	1420	NA	156
	17-Aug	194	104	31.1	541	212	17	46	1460	8.40	156
MEAN			98	28.3	536	205	16	108	1480	NA	157
EM	18-Jun	27	73	22.4	446	168	11	235	1300	NA	137
	23-Jul	101	83	24.0	438	173	11	87	1520	6.95	NA
	17-Aug	197	84	21.5	396	162	11	40	1140	8.33	122
MEAN			80	22.6	427	168	11	121	1320	7.64	130
CM	18-Jun	28	79	26.5	438	177	23	39	1400	NA	134
	23-Jul	102	87	28.5	433	179	8	96	1690	6.97	NA
	17-Aug	198	90	27.2	443	193	11	41	1250	8.31	133
MEAN			85	27.4	438	183	14	58	1447	7.64	134

Table 12. Cont'd.

Location	Date	Anal#	Na	K	Ca	Mg	Cl	SO_4	DIC	pH	COND
			µm/L								µS/cm
WM	18-Jun	29	83	28.1	433	177	25	39	1460	NA	139
	23-Jul	103	88	30.2	462	191	8	74	1640	6.95	NA
	17-Aug	199	93	27.7	425	189	17	39	1200	8.30	128
MEAN			88	28.7	440	186	17	50	1433	7.63	134
I	19-Jun	34	90	42.7	396	189	42	247	1300	NA	136
	25-Jul	112	92	43.5	375	187	14	37	1410	7.78	120
	18-Aug	209	97	46.4	385	191	20	79	1280	8.12	122
MEAN			93	44.2	385	189	25	121	1330	7.95	126
WB	20-Jun	43	90	21.3	219	112	20	49	707	NA	81
	20-Jul	92	99	22.8	237	117	20	37	831	NA	90
	24-Aug	237	105	24.9	266	129	20	39	870	7.93	89
MEAN			98	23.0	241	119	20	42	803	NA	87

Table 13. Dissolved and suspended constituents at 1981 sampling sites; Fe, Mn, total dissolved nitrogen (TDN), total dissolved phosphorous (TDP), NH_4, dissolved organic carbon (DOC), suspended nitrogen (SN), suspended phosporous (SP) and chlorophyll-a (Chl-a) at 13 sites in the area of the Churchill River diversion, 1981. The analytical number (Anal #) is an internal reference number.

Location	Date	Anal#	Fe	Mn	TDN	TDP	NH_4	DOC	SC	SN	SP	Chl-a
			µm/L									µg/L
G	19-Jun	35	1.13	<0.36	21	0.19	0.10	1980	29.7	3.4	0.26	2.3
	25-Jul	111	1.10	<0.36	NA	NA	0.33	560	37.8	1.5	0.32	4.3
	18-Aug	207	<0.36	<0.18	NA	NA	0.23	970	48.5	6.7	0.37	3.7
MEAN			<0.86	<0.30	NA	NA	0.22	1170	38.7	3.9	0.32	3.4
6	19-Jun	33	0.75	<0.36	20	0.13	0.11	680	27.0	3.4	0.27	1.5
	25-Jul	113	2.20	<0.36	NA	NA	0.53	530	28.0	2.6	0.39	4.7
	18-Aug	208	<0.36	2.68	NA	NA	0.20	550	25.3	3.8	0.32	1.8
MEAN			<1.10	<1.14	NA	NA	0.28	587	26.8	3.3	0.33	2.7
4	19-Jun	31	0.75	<0.36	23	0.39	0.25	490	21.7	2.4	0.34	2.1
	25-Jul	109	1.65	<0.36	NA	NA	0.32	600	28.7	4.1	0.28	3.0
	18-Aug	205	<0.36	<0.18	NA	NA	0.20	1150	26.0	3.9	0.30	2.0
MEAN			<0.92	<0.30	NA	NA	0.26	747	25.4	3.5	0.31	2.4
5	19-Jun	30	0.38	0.36	23	0.13	0.33	640	58.2	5.8	0.28	2.8
	25-Jul	108	1.10	<0.36	NA	NA	0.36	670	35.7	6.0	0.36	3.1
	18-Aug	204	<0.36	<0.18	NA	NA	0.26	660	41.2	5.7	0.30	3.3
MEAN			<0.61	<0.30	NA	NA	0.32	657	45.0	5.8	0.31	3.1
SA	19-Jun	32	1.50	<0.36	24	0.23	0.20	970	29.8	3.5	0.27	2.2
	25-Jul	110	1.65	<0.36	NA	NA	0.29	770	58.8	11.1	0.36	6.8
	18-Aug	206	0.88	<0.18	NA	NA	0.16	1050	45.3	6.3	0.39	3.9
MEAN			1.35	<0.30	NA	NA	0.22	930	44.7	7.0	0.34	4.3

Table 13. Cont'd.

Location	Date	Anal#	Fe	Mn	TDN	TDP	NH4	DOC	SC	SN	SP	Chl-a
							µm/L					µg/L
NW	18-Jun	24	0.75	0.36	22	0.16	0.51	610	35.5	4.3	0.26	1.3
	24-Jul	107	1.10	<0.36	NA	NA	0.54	600	23.2	3.0	0.26	2.6
	17-Aug	195	0.44	<0.18	NA	NA	0.39	660	17.0	2.9	0.19	1.9
MEAN			0.77	<0.30	NA	NA	0.48	623	25.2	3.4	0.24	1.9
NE	18-Jun	25	1.13	<0.36	21	0.23	0.78	2030	45.3	5.9	0.37	2.3
	24-Jul	106	1.10	<0.36	NA	NA	0.60	590	27.7	3.5	0.30	4.1
	17-Aug	196	<0.36	<0.18	NA	NA	0.17	670	46.5	9.3	NA	3.4
MEAN			<0.86	<0.30	NA	NA	0.52	1097	39.8	6.2	0.34	3.3
F	18-Jun	26	1.13	<0.36	29	0.29	0.12	2260	47.5	5.3	0.53	3.3
	24-Jul	105	1.10	<0.36	NA	NA	0.46	870	83.3	14.4	0.70	11.1
	17-Aug	194	<0.36	<0.18	NA	NA	0.73	1050	128.7	24.6	0.99	23.2
MEAN			<0.86	<0.30	NA	NA	0.44	1393	86.5	14.7	0.74	12.5
EM	18-Jun	27	0.75	<0.36	30	0.13	0.24	2450	115.5	7.6	0.48	3.2
	23-Jul	101	0.55	<0.36	NA	NA	<0.03	1480	95.2	15.6	0.44	7.9
	17-Aug	197	<0.36	<0.18	NA	NA	0.12	1030	244.3	42.5	0.95	23.8
MEAN			<0.55	<0.30	NA	NA	<0.13	1653	151.7	21.9	0.62	11.6
CM	18-Jun	28	0.75	0.36	29	0.23	0.36	1030	44.8	5.8	0.54	2.6
	23-Jul	102	1.10	<0.36	NA	NA	0.42	1710	33.7	5.2	0.55	3.2
	17-Aug	198	<0.36	<0.18	NA	NA	0.84	990	58.7	9.3	0.37	7.3
MEAN			<0.74	<0.30	NA	NA	0.54	1243	45.7	6.8	0.49	4.4

Table 13. Cont'd.

Location	Date	Anal#	Fe	Mn	TDN	TDP	NH4	DOC	SC	SN	SP	Chl-a
							µm/L					µg/L
WM	18-Jun	29	0.75	0.36	29	0.35	0.66	720	44.0	5.6	0.54	< 0.1
	23-Jul	103	1.10	<0.36	NA	NA	0.97	1300	91.5	15.9	0.86	9.5
	17-Aug	199	<0.36	<0.18	NA	NA	0.46	1080	192.5	35.0	1.37	34.6
MEAN			<0.74	<0.30	NA	NA	0.70	1033	109.3	18.8	0.92	<14.7
I	19-Jun	34	3.01	0.36	44	0.77	0.20	3080	126.3	10.8	1.15	5.4
	25-Jul	112	9.91	1.93	NA	NA	1.78	870	136.3	29.6	1.50	26.0
	18-Aug	209	0.44	<0.18	NA	NA	9.27	1340	53.2	8.2	0.84	6.8
MEAN			4.45	<0.83	NA	NA	3.75	1763	105.3	16.2	1.16	12.7
WB	20-Jun	43	0.75	<0.36	22	0.16	0.49	680	24.5	2.3	0.28	1.1
	20-Jul	92	1.10	<0.36	21	0.19	0.50	600	39.0	4.9	0.28	3.1
	24-Aug	237	0.88	<0.18	23	0.29	0.54	690	35.3	4.9	0.21	2.2
MEAN			0.91	<0.30	22	0.22	0.51	657	32.9	4.0	0.26	2.1

Table 14. Other limnological variables at 1981 sampling sites; total suspended solids (TSS), temperature (TEMP), daily primary production of carbon (PROD), molecular oxygen concentration (O_2 CONC), relative saturation (O_2 SAT) and oxygen consumption in the water column (O_2 RESP), and absorbances at 455 nm after centrifugation and at 543 nm before filtration (UNFILT), after filtration (FILT), and after centrifugation (CENT) at 13 sites in the area of the Churchill River diversion, 1981. The "MEAN" primary production value is the mean integral daily carbon fixed by photosynthesis over the period 19 June to 18 August inclusive (61 days). The analytical number (Anal #) is an internal reference number.

Location	Date	Anal#	TSS mg/L	TEMP °C	PROD carbon $mg/m^{-2}d$	O_2 CONC µm/L	O_2 SAT %	O_2 RESP $µm/m^{-3}hr$	Absorbances at wavelengths 455 nm (ABS)	543 nm UNFILT	543 nm FILT	543 nm CENT
G	19-Jun	35	6.1	NA	194	327	NA	107	0.034	0.082	0.022	0.011
	25-Jul	111	NA	17.78	823	290	97	294	0.031	0.115	0.021	0.010
	18-Aug	207	4.0	20.55	590	290	102	438	0.028	0.083	0.020	0.012
MEAN			5.0	19.17	587	302	100	280	0.031	0.093	0.021	0.011
6	19-Jun	33	5.9	14.09	122	354	109	247	0.034	0.201	0.032	0.013
	25-Jul	113	8.8	16.69	278	295	96	265	0.038	0.380	0.070	0.013
	18-Aug	208	5.3	18.90	284	281	96	218	0.033	0.183	0.051	0.012
MEAN			6.7	16.56	238	310	100	243	0.035	0.255	0.051	0.013
4	19-Jun	31	8.0	4.73	96	385	95	519	0.040	0.264	0.085	0.017
	25-Jul	109	5.3	NA	551	325	NA	408	0.040	0.162	0.058	0.015
	18-Aug	205	NA	17.36	228	303	100	290	0.036	0.177	0.042	0.015
MEAN			6.6	11.05	310	338	98	406	0.039	0.201	0.062	0.016
5	19-Jun	30	3.2	7.12	224	358	94	755	0.072	0.064	0.036	0.025
	25-Jul	108	3.3	16.55	499	304	99	219	0.065	0.110	0.038	0.022
	18-Aug	204	3.1	17.97	414	283	95	343	0.062	0.099	0.028	0.022
MEAN			3.2	13.88	408	315	96	439	0.066	0.091	0.034	0.023

Table 14. Cont'd.

Location	Date	Anal#	TSS mg/L	TEMP °C	PROD carbon $mg/m^{-2}d$	O_2 CONC µm/L	O_2 SAT %	O_2 RESP $µm/m^{-3}hr$	Absorbances at wavelengths 455 nm (ABS)	543 nm UNFILT	543 nm FILT	543 nm CENT
SA	19-Jun	32	3.5	16.00	170	294	95	169	0.165	0.179	0.085	0.065
	25-Jul	110	2.1	NA	866	289	NA	545	0.108	0.110	0.050	0.039
	18-Aug	206	3.0	18.63	441	268	91	380	0.042	0.108	0.044	0.033
MEAN			2.9	17.32	543	284	93	365	0.105	0.132	0.060	0.046
NW	18-Jun	24	NA	10.36	140	332	95	142	0.043	0.068	NA	0.021
	24-Jul	107	NA	17.25	1177	275	91	267	0.038	0.075	0.020	0.010
	17-Aug	195	1.7	18.48	260	275	93	164	0.040	0.063	0.025	0.012
MEAN			NA	15.36	734	294	93	191	0.040	0.069	0.023	0.014
NE	18-Jun	25	3.3	8.74	199	344	95	354	0.045	0.127	NA	0.018
	24-Jul	106	NA	12.15	534	278	82	252	0.040	0.092	0.023	0.012
	17-Aug	196	2.1	18.44	640	293	99	412	0.035	0.065	0.015	0.010
MEAN			2.7	13.11	436	305	92	339	0.040	0.095	0.019	0.013
F	18-Jun	26	4.6	13.74	186	298	92	114	0.070	0.142	NA	0.022
	24-Jul	105	NA	17.80	1928	285	95	536	0.062	0.152	0.027	0.018
	17-Aug	194	5.8	18.63	1421	283	96	1003	0.063	0.120	0.026	0.018
MEAN			5.2	16.72	1262	289	94	551	0.065	0.138	0.027	0.019
EM	18-Jun	27	3.2	14.67	321	302	95	151	0.044	0.082	NA	0.014
	23-Jul	101	4.1	20.50	1462	302	106	523	0.038	0.088	0.018	0.012
	17-Aug	197	7.3	19.23	1682	303	104	1117	0.040	0.182	0.020	0.010
MEAN			4.9	18.13	1238	302	102	597	0.041	0.117	0.019	0.012

Table 14. Cont'd.

Location	Date	Anal#	TSS mg/L	TEMP °C	PROD carbon $mg/m^{-2}d$	O_2 CONC $\mu m/L$	O_2 SAT %	O_2 RESP $\mu m/m^{-3}hr$	Absorbances at wavelengths: 455 nm (ABS)	543 nm UNFILT	543 nm FILT	543 nm CENT
CM	18-Jun	28	2.7	12.19	215	305	91	73	0.060	0.091	NA	0.020
	23-Jul	102	1.6	19.06	281	284	97	247	0.051	0.060	0.024	0.016
	17-Aug	198	2.9	18.96	1055	297	101	538	0.050	0.082	0.020	0.013
MEAN			2.4	16.74	415	295	96	286	0.054	0.078	0.022	0.016
WM	18-Jun	29	2.0	11.34	171	251	73	122	0.055	0.059	NA	0.019
	23-Jul	103	3.7	18.21	1340	266	90	468	0.050	0.097	0.022	0.018
	17-Aug	199	7.7	19.33	1720	300	104	1295	0.054	0.175	0.025	0.014
MEAN			4.5	16.29	1113	272	89	628	0.053	0.110	0.024	0.017
I	19-Jun	34	3.3	14.59	205	224	70	NA	0.147	0.144	0.064	0.053
	25-Jul	112	NA	16.53	1523	248	81	727	0.190	0.178	0.068	0.062
	18-Aug	209	1.7	19.12	392	192	67	964	0.178	0.106	0.068	0.061
MEAN			2.5	16.75	972	221	73	896	0.172	0.143	0.067	0.059
WB	20-Jun	43	3.8	15.80	224	NA	NA	NA	0.055	0.123	0.040	0.021
	20-Jul	92	3.5	18.97	545	279	95	376	0.040	0.108	0.030	0.014
	24-Aug	237	NA	20.43	339	271	95	260	0.032	0.102	0.028	0.011
MEAN			3.6	18.40	451	275	95	318	0.042	0.111	0.033	0.015

Table 15. Concentration of total mercury ($\mu g \cdot g^{-1}$ dry weight) in various zooplankton size fractions from 13 sites in the area of the Churchill River diversion, 1981. See methods for parameter codes and sampling times.

Site*	Z73(1)	Z73(2)	Z73(3)	MZ73	Z153(1)	Z153(2)	Z153(3)	MZ153	Z351(1)	Z351(2)	Z351(3)	MZ351	Z760(1)	Z760(2)	Z760(3)	MZ760
CM	0.050	0.48	0.04	0.190	0.019	0.64	0.16	0.273	0.04	1.12	0.26	0.461	no sample	0.22	no sample	0.22
EM	0.039	1.65	0.39	0.693	0.007	0.86	0.27	0.374	0.046	5.00	1.32	2.122	no sample			
F	0.074	1.42	no sample	0.747	0.018	1.37	0.66	0.683	0.050	1.88	1.07	1.00	0.40	1.51	1.12	0.890
G	0.020	0.38	1.23	0.543	0.011	no sample	0.63	0.321	0.089	0.63	0.32	0.346	no sample	no sample	<0.07	<0.07
I	0.063	0.69	0.08	0.278	0.075	no sample	0.11	0.093	no sample	no sample	0.09	0.09	no sample	no sample	0.08	0.08
WB	0.034	3.45	no sample	1.742	0.009	3.19	no sample	1.600	0.0233	no sample	no sample	0.023	no sample			
NE	0.057	2.60	0.88	1.179	0.030	4.38	0.33	1.647	0.053	2.370	1.937	1.451	no sample	3.00	no sample	3.00
NW	0.10	3.20	0.84	1.38	0.19	4.56	1.08	1.943	no sample	3.20	1.67	2.435	no sample			
4	0.15	0.42	1.72	0.763	no sample	0.29	0.21	0.250	no sample	0.54	0.79	0.665	no sample			
5	0.021	0.72	0.28	0.340	0.021	1.66	0.26	0.647	no sample	1.54	0.46	1.00	no sample			
SA	0.050	1.24	0.35	0.547	0.054	1.96	no sample	1.007	0.007	0.12	8.74	2.956	0.009	0.20	3.24	1.150
6	0.10	0.69	0.03	0.273	no sample	2.90	0.03	1.465	no sample	3.93	0.28	2.105	no sample			
WM	0.11	1.41	0.28	0.60	0.058	no sample	1.19	0.624	0.021	2.69	0.40	1.037	no sample	no sample	0.20	0.20

* See Table 1 for key.

Table 16. Correlation coefficients between the mean concentrations of total mercury in yellow perch muscle (YPHG) and spottail shiner muscle (STHG) (Tables 8 and 9) and the concentration of total mercury of the upper 2 cm of unflooded soil (Table 1), of the upper horizons of unflooded soil (Table 2), and of the sediment (Table 4), the apparent depletion of total mercury in soil horizons (Tables 2 and 4), the means of various limnological parameters (Tables 12, 13, and 14), and the means of the concentrations of total mercury in various net plankton size fractions (Table 15) for 13 sites in the area of the Churchill River diversion, 1981. Number of data pairs for each correlation coefficient is shown in parentheses. See methods for parameter codes.

	YPHG		STHG	
STHG	0.65	(6)	-	
Upper 2 cm of soil Hg	-0.01	(7)	0.09	(12)
Moss/peat/litter Hg	-0.01	(7)	0.09	(12)
Ah Hg	0.72	(7)	0.64	(12)
Sediment Hg	0.42	(7)	-0.30	(12)
Moss/peat/litter Hg depletion	0.34	(3)	-0.16	(5)
Ah Hg depletion	0.74	(5)	0.63	(10)
Clay Hg depletion	0.29	(5)	0.02	(10)
Upper 2 cm of soil Hg depletion	0.34	(3)	-0.16	(5)
Mean water temp	-0.58	(7)	-0.84	(12)
Mean TDN	-		-	
Mean TDP	-		-	
Mean TSS	0.01	(7)	-0.27	(12)
Mean suspended P	0.13	(7)	-0.21	(12)
Mean suspended N	0.01	(7)	-0.25	(12)
Mean suspended C	-0.15	(7)	-0.32	(12)
M PROD	0.11	(7)	-0.21	(12)
M DOC	-0.24	(7)	-0.35	(12)
M SAT	-0.09	(7)	-0.35	(12)
M RESP	0.02	(7)	-0.10	(12)
M COND	0.69	(7)	0	(12)
M ABS	0.05	(7)	0.08	(12)
M ΔFILT	0.04	(7)	-0.19	(12)
M ΔCENT	-0.16	(7)	0.14	(12)
M Z73	0.03	(7)	-0.01	(12)
M Z153	0.57	(7)	0.26	(12)
M Z351	-0.03	(7)	0.24	(12)
M Z760	0.87	(5)	0.89	(6)

Table 17. Correlation coefficients between the mean concentrations of total mercury in yellow perch muscle (YPHG) and spottail shiner muscle (STHG) (Tables 8 and 9) and the values of various limnological parameters (Tables 12, 13, and 14) and the concentration of total mercury in various net plankton size fractions (Table 15) for 13 sites in the area of the Churchill River diversion, 1981. Number of data pairs for each correlation coefficient is shown in brackets. See methods for parameter codes.

	YPHG	STHG		YPHG	STHG
TEMP 1	-0.23 (6)	-0.78 (11)	SAT 1	0.21 (6)	0.18 (10)
TEMP 2	-0.19 (7)	-0.69 (10)	SAT 2	-0.64 (5)	-0.45 (8)
TEMP 3	-0.68 (7)	-0.85 (12)	SAT 3	0.01 (7)	-0.33 (12)
TDN 1	0.00 (7)	-0.26 (12)	RESP 1	0.08 (6)	0.68 (11)
TDN 2	-	-	RESP 2	-0.03 (7)	-0.37 (12)
TDN 3	-	-	RESP 3	0.11 (7)	-0.28 (12)
TDP 1	0.01 (7)	0.13 (12)	COND 1	0.49 (7)	-0.02 (12)
TDP 2	-	-	COND 2	0.86 (4)	0.26 (9)
TDP 3	-	-	COND 3	0.78 (7)	0.03 (12)
TSS 1	-0.13 (7)	0.04 (11)	ABS 1	0.14 (7)	-0.03 (12)
TSS 2	-0.68 (4)	0.14 (8)	ABS 2	0.01 (7)	0.09 (12)
TSS 3	0.09 (7)	-0.53 (10)	ABS 3	0.03 (7)	0.37 (12)
SP 1	0.03 (7)	-0.12 (12)	ΔFILT 1	-0.56 (3)	0.09 (6)
SP 2	0.11 (7)	-0.18 (12)	ΔFILT 2	0.12 (7)	-0.01 (12)
SP 3	0.18 (7)	-0.20 (11)	ΔFILT 3	-0.05 (7)	-0.26 (12)
SN 1	-0.12 (7)	0.16 (12)	ΔCENT 1	0.00 (3)	0.01 (6)
SN 2	0.03 (7)	-0.22 (12)	ΔCENT 2	0.08 (7)	0.17 (12)
SN 3	0.01 (7)	-0.30 (12)	ΔCENT 3	-0.19 (7)	-0.04 (12)
SC 1	-0.33 (7)	-0.09 (12)	Z73 (1)	0.47 (7)	0.35 (12)
SC 2	-0.07 (7)	-0.38 (12)	Z73 (2)	0.73 (7)	0.15 (12)
SC 3	-0.05 (7)	-0.34 (12)	Z73 (3)	-0.75 (6)	0.19 (10)
PROD 1	-0.42 (7)	-0.33 (12)	Z153 (1)	0.04 (7)	0.44 (10)
PROD 2	0.15 (7)	-0.09 (12)	Z153 (2)	0.35 (4)	0.26 (10)
PROD 3	0.24 (7)	-0.30 (12)	Z153 (3)	0.16 (7)	0.03 (10)
DOC 1	-0.31 (7)	-0.22 (12)	Z351 (1)	-0.53 (5)	-0.01 (8)
DOC 2	0.14 (7)	-0.33 (12)	Z351 (2)	-0.22 (6)	-0.05 (11)
DOC 3	-0.12 (7)	-0.31 (12)	Z351 (3)	0.12 (7)	-0.07 (11)
			Z760 (1)	-	-
			Z760 (2)	-	0.99 (4)
			Z760 (3)	0.91 (4)	0.35 (4)

Table 18. Correlation coefficients between the mean concentrations of total mercury in yellow perch muscle (YPHG) and spottail shiner muscle (STHG) (Tables 10 and 11) and the concentration of total mercury in upper soil horizons of unflooded soil (Table 3), and the apparent depletion of total mercury in upper soil horizons (Tables 3 and 6) for seven sites in the area of the Churchill River diversion, 1982. Number of data pairs for each correlation coefficient is shown in brackets.

	YPHG	STHG
Moss/peat/litter Hg	-0.12 (7)	-0.05 (7)
Ah Hg	-0.30 (7)	-0.19 (7)
Moss/peat/litter Hg depletion	0.24 (5)	0.17 (5)
Ah Hg depletion	0.33 (5)	0.48 (5)

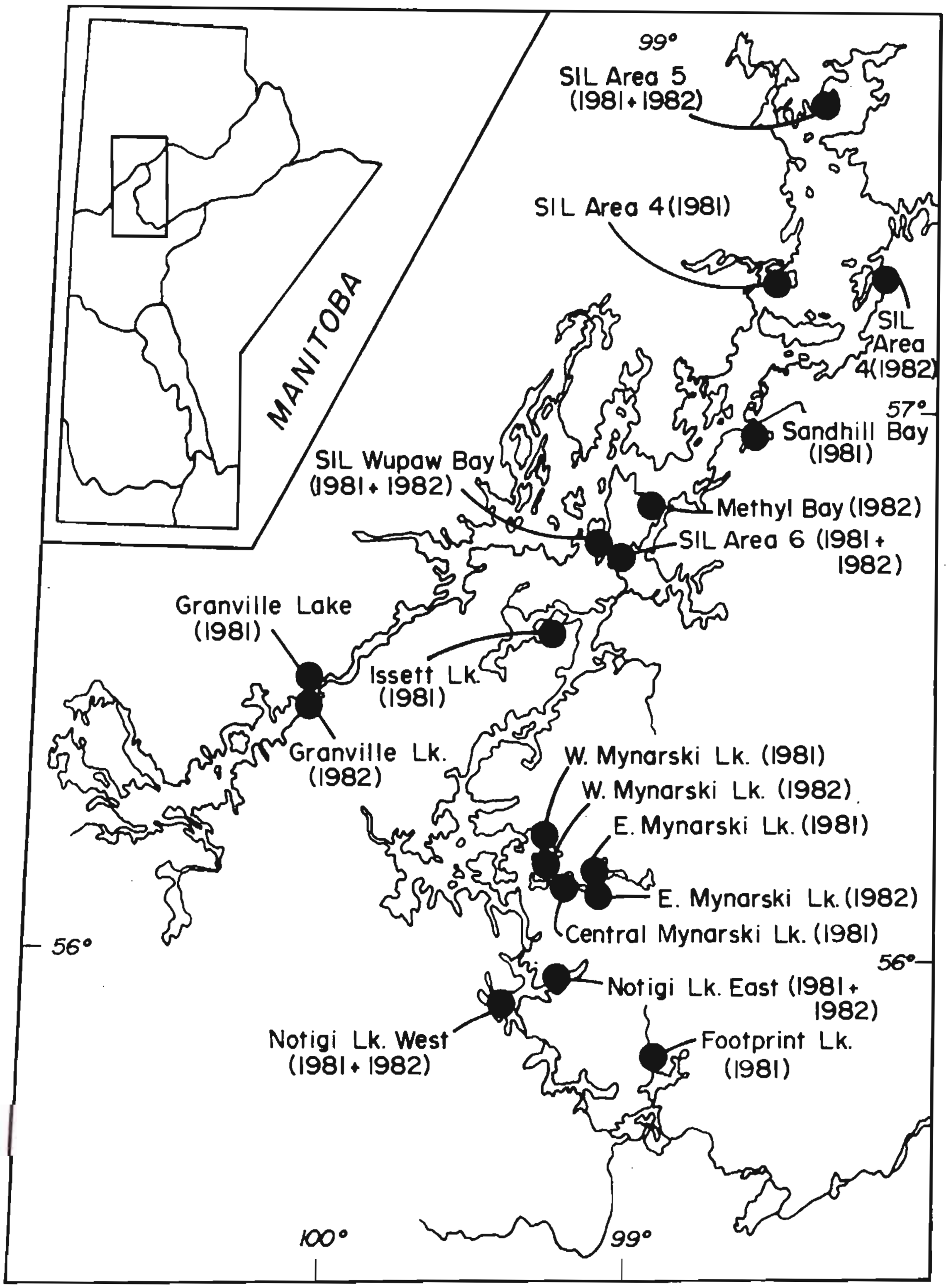

Fig. 1. Map of study area showing sample sites.