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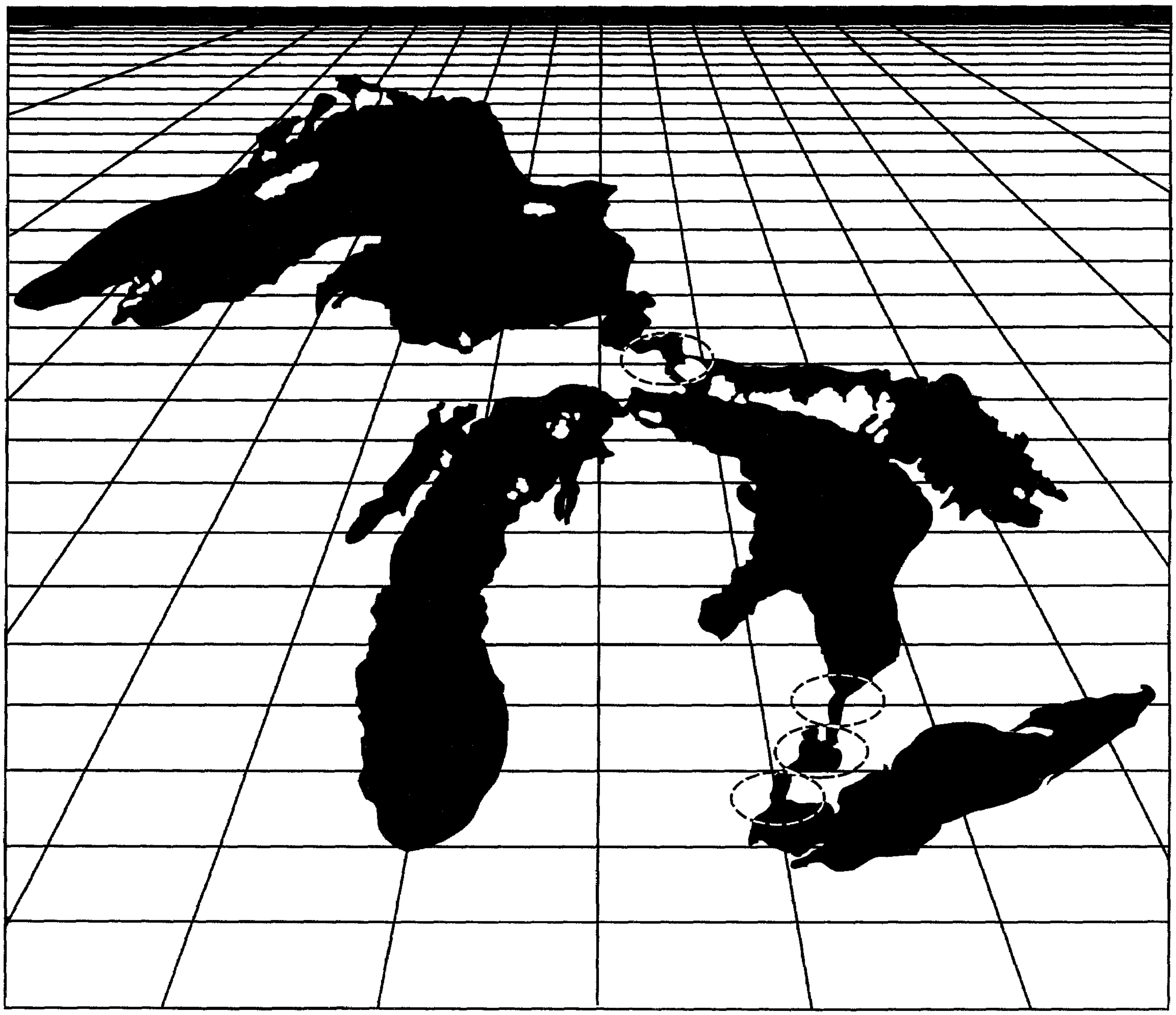
Chemical Contamination and Physical Characteristics Of Sediments in the Upper Great Lakes Connecting Channels 1985



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CHEMICAL CONTAMINATION and PHYSICAL CHARACTERISTICS of SEDIMENTS in the UPPER GREAT LAKES CONNECTING CHANNELS 1985

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ABSTRACT

Contamination of sediments by toxic organic substances and heavy metals was widespread throughout the connecting channels of the upper Great Lakes in 1985. Sediments at 250 stations in the connecting channels were analyzed for total PCBs, oil and grease, phenols, total cyanide, total volatile solids, mercury, cadmium, chromium, cobalt, copper, lead, nickel, and zinc, and the results were evaluated according to U.S. Environmental Protection Agency (USEPA) guidelines for polluted sediments. Guidelines for Cd, Hg, and PCBs by the Ontario Ministry of the Environment, which are more restrictive than USEPA guidelines, are also referenced. The percentage of stations that were contaminated according to USEPA guidelines by at least one of the studied substances was St. Marys River - 92%, St. Clair River - 66%, Lake St. Clair - 65%, and the Detroit River - 81%. Sediments were most heavily contaminated near industrialized areas, although some areas more than 40 km downstream from known point sources of pollution were moderately contaminated by oil and metals.

TABLE OF CONTENTS

TABLE LEGENDS

FIGURE LEGENDS

Page

FIGURE LEGENDS (continued)

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INTRODUCTION

The connecting channels of the upper Great Lakes are the St. Marys River, St. Clair River, Lake St. Clair, and the Detroit River. Because of elevated sediment concentrations of iron and zinc in the St. Marys River and mercury in the St. Clair and Detroit rivers (IJC 1983), the International Joint Commission designated each channel an Area of Concern (Hartig and Thomas 1988). The original designations were based on studies of areas near suspected point sources of pollution. More recent studies describe pollution throughout the Detroit River (Mudroch 1985; Hamdy and Post 1985; Fallon and Horvath 1985) and Lake St. Clair (Thomas et al. 1977). A literature review by Limno-Tech (1985) summarized information on polluted sediments in the upper connecting channels and discussed the problems of integrating results of pollution studies by various methodologies from different years for a variety of contaminants.

In 1985, Canada and the United States initiated an Upper Great Lakes Connecting Channels Study (EC and USEPA 1988) that included several studies of pollution in the connecting channels. As part of this program, we surveyed surficial sediments of the connecting channels from the head of the St. Marys River to the mouth of the Detroit River to determine the extent of sediment contamination.

METHODS

Sediments were collected in May and June 1985 from 250 stations in a 250 cell grid over the upper Great Lakes connecting channels; the number of stations (and cells) was 125 in the St. Marys River, 35 in the St. Clair River, 43 in Lake St. Clair, and 47 in the Detroit River (Fig. 1 and Appendix 1). Each grid cell was 2.2 x 2.2 km in the St. Marys and St. Clair rivers, 4.8 x 6.9 km in Lake St. Clair, and 2.8 x 1.8 km in the Detroit River. In each grid cell, we established one station at the first location where we found fine-grained, silty sediments, suitable for habitation by nymphs of the burrowing mayfly

(Hexagenia). All stations were referenced to readily distinguishable landmarks, including navigation buoys, on National Oceanic and Atmospheric Administration navigation charts (Appendix 1). Of the 250 stations, 97 were in Canadian waters and 153 in U.S. waters.

In each grid cell, 1000-2000 g of wet sediment were collected with a standard Ponar grab that sampled 0.05 m^2 of the bottom. Upon retrieval from the water, the Ponar grab was placed in a clean, galvanized-metal tub and carefully opened so that the in situ profile of the sediment was preserved and the surficial sediments nearest the sediment-water interface did not come into contact with the tub. About 500 g of these surficial sediments were removed from the top 3-cm layer of each sample with a stainless steel spoon, placed in an acetone-washed bottle, stirred, and refrigerated in darkness at 4°C. In a few instances, more than one grab sample was collected to provide the volume of sediment needed for analysis. The tub and spoon were rinsed several times with river water between each use.

Each sample was analyzed for cyanide, oil, PCBs (as Aroclors), phenol, volatile solids, mercury, cadmium, chromium, cobalt, copper, lead, nickel, and zinc. Heavy metals, with the exception of mercury, were analyzed by standard methodology (Inductively Coupled Adsorption Plasma [ICAP] analysis; Federal Register 1979; Appendix 2). Mercury was analyzed by a tin chloride reduction and cold vapor trapping technique (Plumb 1981). All other contaminants were analyzed on a dry weight basis by standard methodology (USEPA 1979a, 1979b; Appendix 2).

According to established procedures for reporting low-level data (ASTM 1983), analytical results below the limit of detection for a particular method are designated in the appendices by the code "t". This code indicates that the individual datum with which it is associated does not differ significantly from zero in the judgement of the laboratory that did the analysis. Such values occurred for certain estimates of mercury, oil and grease, phenol, and most of the estimates for total cyanide (Appendices 3 and 4). However, because the procedures recommend that actual measured values be reported, even if they fall below the criterion of detection (IJC 1980), we used the actual reported values in all tables and in the maps of contamination distribution. Approximate limits of detection for each parameter are presented in Appendix 2.

The particle-size composition of each surficial sediment sample (Appendix 5) was also measured and interpreted by standard classification criteria (ASTM 1969, 1971). These criteria define silt and clay as material 0.06 mm or less in diameter that passes through a #200 U.S. Standard Sieve. We define very fine sand as sediment that passes a #100 U.S. Standard Sieve but is retained on a #200 U.S. Standard Sieve.

The extent of sediment contamination was judged by guidelines of the U.S. Environmental Protection Agency (USEPA) for polluted sediments (IJC 1982). Guidelines of the Ontario Ministry of the Environment (OMOE) for polluted sediments (IJC 1982) were also used for comparative purposes (Table 1). Except for Cd, Hg, and PCBs, OMOE guidelines fall within the range defined by USEPA guidelines for moderately polluted sediments. No guidelines were listed by either USEPA or OMOE for cobalt or phenols. However, to provide a basis in this report for assessing relative contamination by these materials, sediments containing cobalt were grouped as < 6 mg/kg, 6-10 mg/kg, and > 10 mg/kg, and sediments containing phenols were grouped as < 1 mg/kg, 1-4 mg/kg, and > 4 mg/kg.

Quality Assurance/Quality Control Procedures

To ensure cleanliness, glass sediment collection jars were checked for organic (chlorinated hydrocarbons and phthalate esters) and metal contamination before they were used in the field. Jars, lids and aluminum-foil lid-liners were washed with detergent (Alconox 1), rinsed once with tap water, rinsed three times with distilled water and spectrograde acetone, and heated to 135°C for five days. Organic contamination was determined for three sets of jars, lids, and liners selected randomly from the 300 that were heat-treated. The three sets were each rinsed with about 10 ml of petroleum ether and the three rinses were combined and analyzed with a petroleum ether system blank on a gas chromatograph. For determination of metal contamination, 10 other sets of jars, lids, and liners were selected at random from the heat-treated 300, and each was rinsed with about 20 ml of 10% nitric acid (Ultrex). The rinses were combined, analyzed by plasma emission spectrophotometry, and compared to a 10% nitric acid blank. Bottle blanks, consisting of heat-treated jars sealed with solvent-rinsed, foil-lined lids, were taken into the field where they were briefly opened in air, resealed, handled like the sediment samples, and analyzed for organic contamination. No contamination was reported for any of the sample containers (jars, liners, and caps) or the bottle blanks.

To provide estimates of sampling and analytical variance, duplicate sediment samples were collected at 25 stations selected randomly from among the 250 sample stations. These 25 duplicate samples were given coded labels (to conceal the station number) and then submitted with the other 250 samples for analysis of organic and metal contamination. The results of the duplicate analyses are summarized in Table 2.

Laboratory procedures for PCBs, metals, and cyanide included analysis of sample container blanks (to detect contamination or interfering peaks), spikes (to identify % recovery), and duplicates (to determine repeatability) with each set of samples. For ICAP metals, mercury, and cyanide, the analyses also included check standards (for instrument accuracy). For each group of samples, all EPA-approved limits for the Quality Control analyses (Appendix 2) were met or the samples were re-analyzed.

RESULTS

General Patterns of Contamination

At 204 (82%) of the 250 sample stations, sediment concentrations of at least one pollutant exceeded USEPA guidelines for moderate or heavy pollution (Table 3; Appendices 3-5). Contamination was most widespread in the St. Marys River (92% of stations) followed by the Detroit River (81%), Lake St. Clair (65%), and the St. Clair River (66%). When OMOE guidelines were substituted for USEPA guidelines for cadmium, mercury, and PCBs, the total number of contaminated stations in all four channels combined increased to 222 (89%), with the percentage of contaminated stations increasing to 94% in the St. Marys River, 91% in the Detroit River, 70% in Lake St. Clair, and 89% in the St. Clair River.

All of the 11 pollutants of Table 1 were found at concentrations exceeding either USEPA or OMOE guidelines at one or more stations in each of the connecting channels; the exceptions were chromium in the St. Clair River and oil and grease in Lake St. Clair (Table 4). Concentrations of cadmium in the St. Marys River, St. Clair River, and Lake St. Clair; mercury in the St. Marys River and St. Clair River; and PCBs in the St. Clair River and Lake St. Clair exceeded OMOE guidelines but not those of USEPA. In the Detroit River, all pollutants exceeded USEPA guidelines at one or more stations.

Contamination of a station by more than one substance was common (Table 3). According to USEPA and OMOE guidelines, samples from 64 (32%) of the 203 stations in the upper three channels were contaminated by a single substance, but 97 stations (48%) were contaminated by 2-6 substances, and 18 stations (9%) by 7-11 substances. In the Detroit River, a much smaller percentage of stations was contaminated by a single substance (6 stations, 13%) and 2-6 substances (14 stations, 30%), and a greater percentage was contaminated by 7-11 substances (23 stations, 49%).

In the three upper channels, 78% of the stations that were contaminated by metals, 95% of those contaminated by PCBs, and 64% of those contaminated by cyanide were also contaminated by substances from one or more other major contaminant groups (Appendices 3 and 4; Fig. 2). In the Detroit River, 94-95% of the stations that were contaminated by metals, PCBs, or cyanide were also contaminated by substances from one or more of the major contaminant groups. All of the stations in all four channels that were contaminated by oil and grease were also contaminated with one or more other substances.

Some groups of contaminants tended to occur together. According to USEPA or OMOE guidelines, 88% of all stations contaminated by oil and grease and 74% of the stations contaminated by PCBs were also contaminated by at least one heavy metal (Appendices 3 and 4), although no one metal dominated the association. In the Detroit River, all stations contaminated by oil and grease were also contaminated by metals, PCBs, and cyanide.

The percentage of stations with clean sediments (i.e. no contaminants exceeded the guidelines of Table 1), or sediments that were moderately or heavily contaminated, varied considerably among the four channels (Fig. 3). The percentage of stations with clean sediments was highest in Lake St. Clair (30%) and lowest in the St. Marys River (6%). Moderately contaminated sediments occurred most frequently in the St. Clair River (71% of the stations) and least frequently in the Lake St. Clair (56% of the stations). Heavily polluted sediments occurred most frequently in the Detroit River (34% of the stations) and least frequently in Lake St. Clair (14% of the stations).

Many of the values in Appendix 4 for cyanide exceeded USEPA guidelines for moderately contaminated sediments and, therefore, are reflected in Tables 3 and 4 and in Fig. 3 (forward bars). However, we believe these cyanide data should be interpreted with caution because almost all of the values carry the "t" notation, which indicates that they were smaller than or equal to the calculated limit of detection for the sample. Excluding the cyanide data from consideration would increase the percentage of clean stations to 56% for Lake St. Clair and to 32% for the St. Marys River, while decreasing the percentage of highly contaminated stations to 5% for Lake St. Clair and 13% for the St. Marys River (Fig. 3). Excluding the the cyanide data would have little effect on the percentage of clean and contaminated stations in the St. Clair River and the Detroit River.

Metals

The mean and maximum concentrations of the heavy metals were highest in the Detroit River, except for cobalt, which was highest in the St. Marys River (Table 5). The lowest mean and lowest maximum concentrations for copper, lead, and zinc occurred in Lake St. Clair; for chromium and nickle in the St. Clair River; and for mercury in the St. Marys River. For cadmium and cobalt, the lowest means were observed in Lake St. Clair, while the lowest maximum values occurred in the St. Clair River.

Copper exceeded USEPA guidelines for moderate or heavy pollution at 85 (34%) of the stations (Table 4; Fig. 4). Contamination was heavy in the upper St. Marys River, the upper St. Clair River, and throughout the Detroit River. Only four stations in Lake St. Clair were moderately polluted with copper, and none was heavily polluted.

Lead contamination was found at 45 (18%) of the stations (Table 4; Fig. 5), and the distribution of lead-contaminated stations resembled copper-contaminated stations. Most samples (56%) exhibiting lead pollution, were heavily contaminated according to USEPA guidelines, and were near areas receiving industrial discharges. Only one station in Lake St. Clair contained moderate lead contamination.

Nickel contamination occurred at 80 (32%) of the stations (Table 4; Fig. 6). Heavy contamination was restricted to the Detroit River, whereas moderate nickel contamination was found throughout the St. Marys River, upper St. Clair River, parts of Lake St. Clair, and the entire Detroit River.

Zinc contamination occurred at 58 (23%) of the stations (Table 4; Fig. 7). Heavy pollution by zinc, as observed for copper, was restricted to the upper St. Marys River and to one station in the St. Clair River, but was widespread in the Detroit River. Moderate pollution was more common than heavy pollution by zinc in the St. Marys and St. Clair rivers and Lake St. Clair, but heavy zinc pollution was common in the Detroit River.

Chromium concentrations exceeded USEPA pollution guidelines in three of the four channels (Table 4; Fig. 8); moderate contamination was common in all areas of the St. Marys River and the Detroit River. Sediments with heavy chromium pollution were restricted to one station in the upper St. Marys River and three stations in the Detroit River. No samples from the St. Clair River exhibited chromium pollution and only two stations were moderately polluted in Lake St. Clair.

Heavy contamination with cadmium (>6 mg/kg) that exceeded the USEPA guideline for sediments occurred at only two stations in the Trenton Channel (Table 4; Fig. 9). No USEPA guideline exists for moderate contamination of cadmium in sediments. However, if the OMOE guideline of 1 mg/kg is used, additional stations in the St. Marys River (5), St. Clair River (2), Lake St. Clair (2), and the Detroit River (17) were polluted (Table 4; Appendix 3).

Concentrations of mercury exceeded the USEPA guideline for heavily contaminated sediments (1.0 mg/kg) at two stations near the center of Lake St. Clair, at one station in the Detroit River proper, and at three in the Trenton Channel (Table 4; Fig. 10). Although no USEPA guideline exists to distinguish moderately polluted sediments, the OMOE guideline of 0.3 mg/kg was exceeded in 1 sample from the St. Marys River, 8 samples from the St. Clair River, 9 from Lake St. Clair, and 21 from the Detroit River.

Like copper, cobalt in the connecting channels was widespread, especially throughout the St. Marys River and the Detroit River. No USEPA or OMOE sediment pollution guidelines exist for cobalt, but concentrations were highest (6 mg/kg or higher) in the industrial portions of the channels and in deposition areas in Lake Munuscong (lower St. Marys River) and central Lake St. Clair (Fig. 11).

Organics

Heavy pollution by oil and grease occurred at 20 (8%) of the stations and was most common near industrial areas in the upper St. Marys River and the Detroit River (Fig. 12). Heavy pollution by oil and grease also was observed several kilometers from any known point source, particularly in the St. Marys River and the St. Clair River. Moderate contamination by oil and grease was found at 14 (6%) of the stations.

Concentrations of total PCBs in the sediments exceeded the USEPA guideline for moderately polluted sediments (1 mg/kg) at only one site in the St. Marys River and six sites in the Detroit River (Fig. 13). No PCB concentrations exceeded the USEPA guideline of 10 mg/kg that identifies sediments as "polluted and unacceptable for open lake disposal no matter what the other data indicate" (IJC 1982). However, the number of stations in each river that exceeded the OMOE guideline for sediments contaminated by PCBs (0.05 mg/kg) was high: St. Marys River - 33, St. Clair River - 16, Lake St. Clair -8, Detroit River - 33 (Table 4).

In the St. Marys River, St. Clair River, and Lake St. Clair, PCBs were identified almost exclusively as Aroclors 1248 and 1254 (Appendix 4). However, Aroclor 1260 was identified in one sample from the middle reach of the St. Marys River and in 56% of the samples from the Detroit River that contained PCBs. Nowhere throughout the connecting channels was Aroclor 1242 identified.

Volatile solids exceeded USEPA guidelines for contaminated sediments at 41 (16%) of the stations, and highest concentrations occurred in samples from the upper St. Marys River and the Detroit River (Fig. 14). Most heavily polluted samples were associated with industrialized areas of the connecting channels. Only two stations in the St. Clair River and two in Lake St. Clair were moderately contaminated by volatile solids.

No guidelines for phenol contamination of sediments have been established by USEPA or OMOE. The sediments most heavily polluted by phenols (> 4 mg/kg) were from the upper St. Marys River and the upper St. Clair River (Fig. 15). Lower concentrations of phenols (1-4 mg/kg) were observed in some samples from all four channels.

Cyanide was the most widespread contaminant, occurring at 164 (66%) of the stations (Fig. 16). Of the stations contaminated with cyanide, most (72%) were only moderately polluted. Heavy contamination was found most often in the upper St. Marys River, the lower Detroit River, and some nearshore areas of Lake St. Clair. As noted previously, these data should be treated with caution because most reported values were less than the limit of detection claimed by the laboratory that performed the analyses.

Grain Size Analysis

Sediment that we collected at the 280 stations throughout the four channels was composed largely of fine-grained materials (Appendix 5). These included fine sand, very fine sand, silt, and clay. More than half of the sediment in the samples was very fine sand, silt, and clay at 66% of the stations in the St. Marys River, 73% of those in the St. Clair River, 64% in Lake St. Clair, and 62% in the Detroit River; when the fine sand fraction was included in the calculation, the percentage of stations with sediment composed of more than half fine-grained materials increased to 92, 100, 98, and 96 for the four waterbodies.

DISCUSSION

The results of this study are in general agreement with earlier studies that showed sediments near industrial areas in the Detroit, St. Marys, and St. Clair rivers were contaminated with metals and organic substances. The Detroit River has a long history of pollution (Limno-Tech 1985; Manny et al. 1988). It contains the most heavily contaminated sediments in the upper Great Lakes connecting channels and a disrupted benthic animal community (Thornley and Hamdy 1984). The St. Marys River below Sault Ste. Marie was reported to be heavily contaminated with copper (Hamdy et al. 1978; IJC 1983), and sediment contamination by organic substances in the St. Clair River downstream from the cities of Port Huron, Sarnia, and St. Clair was reported by OMOE (1979) and ENCOTEC (1974).

Because the present study was based on samples that were collected in a grid designed to distribute sampling effort evenly throughout the connecting channels of the upper Great Lakes, we were able to show that metal contaminants were present in sediment deposition areas more than 40 km downstream from known pollution sources. For example, mercury concentrations in sediments were higher in the center of Lake St. Clair than in the St. Clair River near Sarnia, Ontario, where two chloro-alkali plants were a major source of mercury (Limno-Tech 1985). The St. Clair River is narrow, heavily dredged, and has a fast current that enhances the transport of sediments and contaminants to Lake St. Clair, where current velocities are lower and where some of the discharged contaminants seem to be deposited (Rossman 1988).

Of the seven metals we measured, only copper and cadmium were previously considered problem contaminants in all four of the channels (Limno-Tech 1985). However, heavy contamination by nickel and chromium had been documented in the Detroit River (Limno-Tech 1985), and our data show that contamination by nickel, zinc, and lead was almost as widespread as contamination by copper, and that chromium contamination was widely distributed in both the St. Marys River and the Detroit River.

Although cadmium and mercury have been documented as contaminants in the St. Clair River and Lake St. Clair for several years (Thomas 1974; Thomas et al. 1977; OMOE 1979), the significance of the observed concentrations is problematic because two sets of pollution guidelines are in common use for these metals in the Great Lakes region (Table 1). The USEPA guidelines for cadmium and mercury recognize only heavy pollution. If OMOE guidelines are applied, cadmium is a contaminant at 40% of the stations in the Detroit River, whereas mercury is a contaminant at 23% of the stations in the St. Clair River and Lake St. Clair and at 53% of the stations in the Detroit River.

Of the five non-metal sediment contaminants in our survey, total cyanide was most frequently encountered, particularly in the St. Marys River, Detroit River, and Lake St. Clair (Fig. 16). Because it is a natural by-product of organic matter decomposition (Menzer and Nelson 1986), we expected cyanide to be widely distributed in low concentrations. Cyanide has been monitored for many years in these channels (Hamdy et al. 1978), and reported levels vary considerably. Although many of our values for total cyanide were not significantly different from zero (see explanation of "t" notation in the Methods section), these and data of other researchers indicate that cyanide is widely distributed throughout the connecting channels. Because cyanide is highly toxic to aquatic biota (Sunshine 1969; Johnson and Findley 1980), continued monitoring of this substance is warranted.

High concentrations of organic pollutants, including volatile solids and oil and grease, have long been associated with industrial complexes in the St. Marys River, the St. Clair River, and the Detroit River (Limno-Tech 1985). Volatile solids and oil and grease have similar distributions (Figs. 12 and 14) and seem to be readily transported by flowing water. In the St. Marys River, volatile solids and oil and grease were found in Lake George and lower Lake Munuscong more than 30 km downstream from the industrialized Sault Ste. Marie area, suggesting that these substances are indeed readily transported. However, spills may have occurred anywhere from vessels and spills from the abandoned freighterrefueling stations on Lime Island near station 115 may also have contributed to contamination of sediments in lower Lake Munuscong.

Levels of total PCBs have been monitored for many years in the connecting channels (Liston et al. 1980; Bonner and Meresz 1981; Thornley and Hamdy 1984). By USEPA guidelines for dredged sediments, we found total PCB contamination in the upper connecting channels to be minimal. However, if the OMOE guideline for contaminated sediments is applied, 26% of the stations in the St. Marys River, 46% in the St. Clair River, 19% in Lake St. Clair and 83% in the Detroit River were polluted by PCBs. Caution is warranted in interpreting these data because some PCB congeners are more toxic to biota than others (Huckins et al. 1988) and because our data do not distinguish all PCB congeners that may have been present in the samples.

Cobalt and phenol have been identified as contaminants of concern that require future study in the upper connecting channels (Limno-Tech 1985). Although no sediment pollution guidelines have been established by regulatory agencies for these contaminants, our data indicate that both are distributed in the sediments in much the same manner as other contaminants, where levels are highest near industrial areas and in downriver sediment deposition zones.

We conclude that metals and organic contamination of sediment in the upper connecting channels of the Great Lakes is widespread and will likely be of concern for many years. Sediment concentrations of seven metals exceeded USEPA guidelines for moderately and heavily polluted sediments at more than half of our sampling sites. Although most heavy pollution was near industrial areas, contaminants from these areas seem to have been transported downstream and concentrated in areas more than 40 km from known pollution sources.

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Thornley, S. and Y. Hamdy. 1984. "An assessment of the bottom fauna and sediments of the Detroit River". *Ontario Ministry of the Environment Technical Report.* ISBN. 9-7743-8474-3. February. 48 pp.

USEPA (U.S. Environmental Protection Agency). 1979a. *Chemistry laboratory manual for bottom sediments and elutriate testing.* NTIS PB-294596.

USEPA. 1979b. *Methods for chemical analysis of water and wastes.* USEPA 600/4-79-020, Cincinnati.

Table 1. *Ontario Ministry of the Environment (OMOE) and U.S. Environmental Protection Agency (USEPA) pollution classification guidelines for sediments (IJC 1982). Units are mg/kg dry weight of sediment except for volatile solids (%). Dash (-) means no guideline.*

		USEPA	
	OMOE	Moderately polluted	Heavily polluted
Cadmium	1.0	---	> 6
Chromium	25.0	25 - 75	> 75
Copper	25.0	25 - 50	> 50
Cyanide	0.1	0.1 - 0.25	> 0.25
Lead	50.0	40 - 60	> 60
Mercury	0.3	---	> 1.0
Nickel	25.0	20 - 50	> 50
Zinc	100.0	90 - 200	> 200
PCBs	0.05	1.0 - 10.0	> 10.0
Oil and grease	1500	1000 - 2000	> 2000
Volatile solids	6.0	5 - 8	> 8

Table 2. *Duplicate sample analyses performed on 25 sample pairs for 13 contaminants in the upper Great Lakes connecting channels, 1985.*

Contaminant	Relative percentage difference[1/]		N
	Average	Range	
Cadmium	14.9	0.0 - 100.0	25
Cobalt	13.0	0.0 - 50.0	25
Copper	11.0	0.0 - 40.0	25
Chromium	13.9	0.0 - 40.0	25
Lead	17.9	0.0 - 83.3	25
Mercury	55.3	6.8 - 108.6	4
Nickel	14.3	0.0 - 48.3	24
Zinc	17.1	0.0 - 155.3	25
Cyanide	69.9	0.0 - 142.9	3
Oil and grease	43.1	9.0 - 77.7	3
Total PCBs	19.1	0.0 - 82.5	15
Phenols	53.4	4.0 - 66.7	2
Volatile solids	16.0	2.0 - 100.0	25

[1/] Relative percent difference (RPD), calculated as $(|\text{Dup1} - \text{Dup2}|)/[(\text{Dup1} + \text{Dup2})/2] \times 100$. Average RPD was calculated as $(\Sigma \text{RPD}/N)$.

N = Number of duplicate sample pairs in which both values were > zero, ≥ the approximate limit of detection given in Appendix 2, and were not denoted with a "t" in Appendices 3-5.

Range represents minimum and maximum RPD for N sample pairs.

Table 3. *Stations with sediment concentrations of 1-11 contaminants exceeding pollution classification guidelines of the U.S. Environmental Protection Ageny (USEPA) or of the USEPA and Ontario Ministry of Environment (OMOE). Each station is represented by a single sample. The guidelines are given in Table 1.*

Number of contaminants exceeding guidelines in sample	Number of stations (samples) with contaminant concentrations exceeding guidelines									
	St. Marys River		St. Clair River		Lake St. Clair		Detroit River		All channels combined	
	USEPA[1/]	USEPA and OMOE[2/]	USEPA	USEPA and OMOE	USEPA	USEPA and OMOE	USEPA	USEPA and OMOE	USEPA	USEPA and OMOE
1	45	40	13	11	17	13	9	6	84	70
2	22	23	4	12	8	8	3	7	37	50
3	15	15	5	3	1	5	2	4	23	27
4	8	15	1	3	2	2	1	1	12	21
5	8	6	0	2	0	0	3	1	11	9
6	3	3	0	0	0	0	3	1	6	4
7	8	5	0	0	0	1	5	2	13	8
8	6	8	0	0	0	1	6	1	12	10
9	0	1	0	0	0	0	4	7	4	8
10	0	2	0	0	0	0	1	4	1	6
11	0	0	0	0	0	0	1	9	1	9
Total number of contaminated stations	115	118	23	31	28	30	38	43	204	222
Percent of stations contaminated[3/]	92	94	66	89	65	70	81	91	82	89

1/ USEPA guidelines for 11 contaminants (see Table 1).

2/ USEPA guidelines for cadmium, chromium, copper, nickel, lead, zinc, oil and grease, cyanide, and volatile solids; OMOE guidelines for cadmium, mercury, and PCBs (see Table 1).

3/ Calculated as, (total number of contaminated stations in channel/total number of stations in channel) X 100. Total number of stations in channel = St. Marys River - 125; St. Clair River - 35; Lake St. Clair - 43; Detroit River - 47; all channels - 250.

Table 4. *Stations in the upper Great Lakes connecting channels where sediment concentrations of contaminants exceeded the pollution classification guidelines of the U.S. Environmental Protection Agency (USEPA) or (in parentheses) the Ontario Ministry of Environment, for cadmium, mercury, and PCBs. The guidelines are given in Table 1.*

	St. Marys River N[1/]=125		St. Clair River N=35		Lake St. Clair N=43		Detroit River N=47		All channels combined N=250	
	M[2/]	H[3/]	M	H	M	H	M	H	M	H
Volatile solids	9	9	2	0	2	0	13	6	26	15
Oil and grease	9	10	0	2	0	0	5	8	14	20
PCBs	1	0	0	0	0	0	6	0	7	0
	(33)		(16)		(8)		(33)		(90)	
Cyanide	68	29	4	1	22	4	24	12	118	46
Mercury	-[4/]	0	-	0	-	2	-	4	-	6
	(1)		(8)		(9)		(21)		(39)	
Cadmium	-	0	-	0	-	0	-	2	-	2
	(5)		(2)		(2)		(17)		(26)	
Chromium	69	1	0	0	2	0	19	4	90	5
Copper	38	4	15	1	4	0	11	12	68	17
Nickel	42	0	5	0	9	0	19	5	75	5
Lead	7	9	2	3	1	0	10	13	20	25
Zinc	14	9	4	1	2	0	17	11	37	21

[1/] N= number of stations and samples. [2/] M = moderately polluted. [3/] H = heavily polluted. [4/] - = no USEPA guidelines.

Table 5. ***Mean (mg/kg), standard error (SE) and range of 14 contaminants tested in the sediments of the upper Great Lakes connecting channels in 1985.***

	St. Marys River N[1/] = 125			St. Clair River N = 35			Lake St. Clair N = 43			Detroit River N = 47		
	Mean	SE	Range	Mean	SE	Range	Mean	SE	Range	Mean	SE	Range
Mercury	0.05	0.005	0.00-0.31	0.14	0.033	0.00-0.60	0.25	0.078	0.00-2.71	1.61	1.180	0.04-55.80
Cadmium	0.31	0.024	0.20-1.80	0.44	0.039	0.20-1.20	0.28	0.035	0.20-1.40	1.99	0.716	0.20-33.0
Chromium	30.72	1.718	2.70-78.00	10.25	0.512	5.20-15.00	11.78	0.917	2.80-26.00	37.01	6.806	4.80-260.00
Copper	20.57	1.370	1.80-110.00	24.47	2.249	7.10-55.00	12.31	1.258	1.40-30.00	38.23	5.413	3.30-150.00
Nickel	15.31	0.886	1.80-44.00	13.39	0.840	5.90-24.00	13.62	1.033	3.80-33.00	27.24	3.099	6.10-130.00
Lead	20.95	1.752	7.0-130.00	28.23	3.301	7.00-92.00	17.06	1.718	7.00-50.00	65.59	11.866	7.20-360.00
Zinc	69.34	6.374	6.00-470.00	67.40	7.874	28.00-310.00	47.91	3.479	11.00-130.00	272.70	112.349	21.00-5300.00
Cobalt	6.86	0.373	0.900-20.00	5.08	0.289	2.70-8.50	5.05	0.291	1.60-9.50	6.26	0.311	2.30-11.00
Oil and grease	917.34	198.51	0.-16500.00	368.51	110.99	0.-3130.0	162.65	24.443	0.-637.0	1580.99	582.540	14.0-24100.0
Total PCB	0.066	0.1108	0.-3.306	0.053	0.0051	0.-0.127	0.040	0.0060	0.-0.200	0.714	0.2357	0.0-9.130
Phenol	0.386	0.1108	0.-11.000	0.731	0.2445	0.-8.100	0.384	0.0745	0.-2.800	0.391	0.0752	0.0-3.200
Cyanide	0.283	0.0513	0.-3.300	0.026	0.0132	0.-0.400	0.112	0.0271	0.-0.800	0.738	0.3562	0.0-15.700
Volatile solids	3.530	0.3146	0.250-	2.134	0.2209	0.230-6.850	2.314	0.2074	0.520-6.210	5.105	0.8309	0.820-

[1/] N = number of stations and samples.

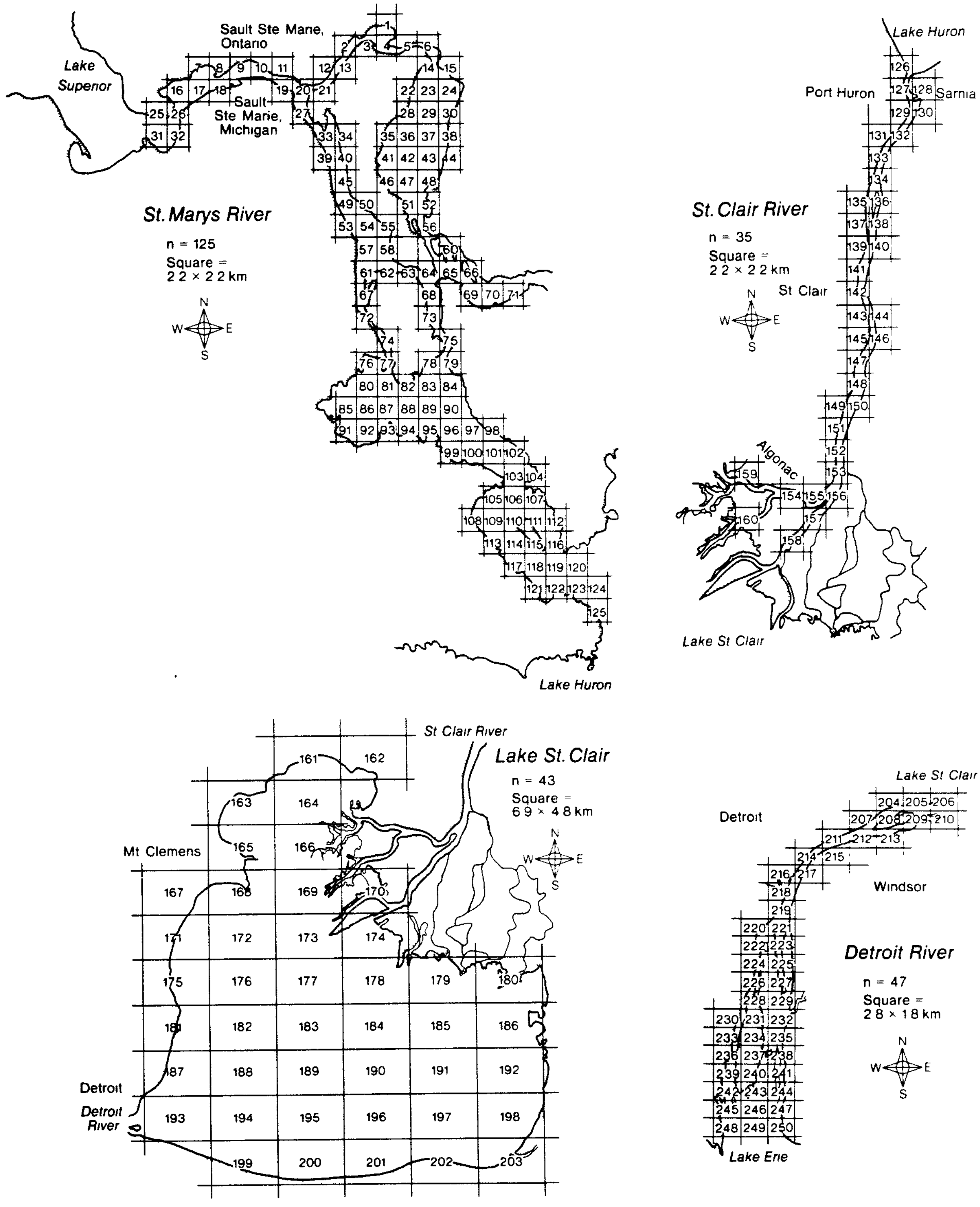


Figure 1. Location of 250 stations in the Great Lakes upper connecting channels where sediment samples were collected in 1985.

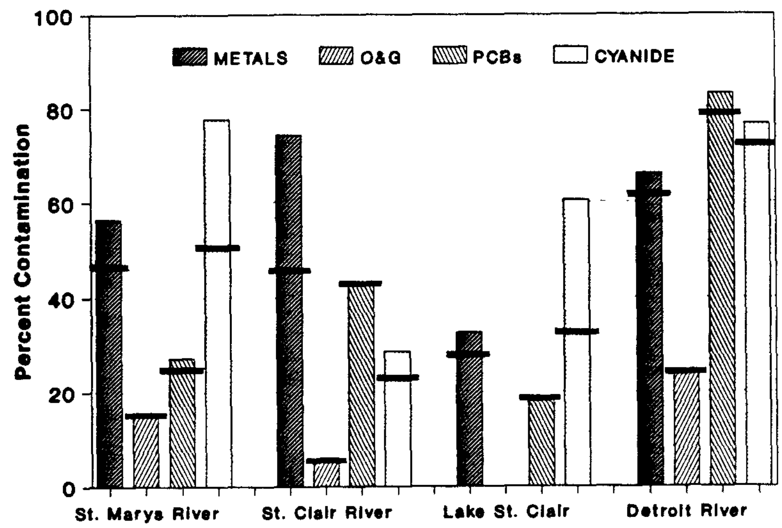


Figure 2. Percentage or stations exceeding USEPA or OMOE guidelines for one or more heavy metals, oil and grease, PCBs, or cyanide. Stations contaminated only by the indicated contaminant group are represented by the portion of the bar above th horizontal line. Stations also contaminated with substances from one or more of the other contaminant groups are represented by the portion of the bar below the horizontal line.

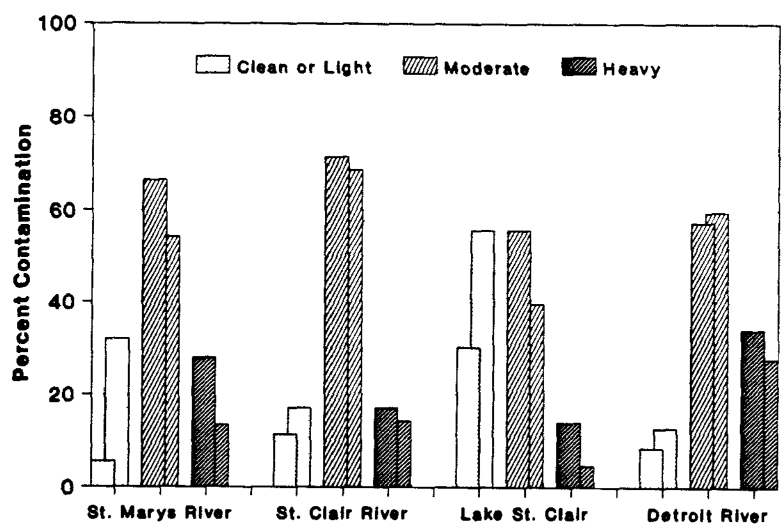


Figure 3. Percentage of stations with clean or with moderately or heavily contaminated sediments in the upper Great Lakes connecting channels in 1985. Stations classified as clean had no exceedances of USEPA or OMOE sediment guidelines. Stations classified as moderately or heavily polluted exceeded USEPA or OMOE guidelines at that level for at least one contaminant.

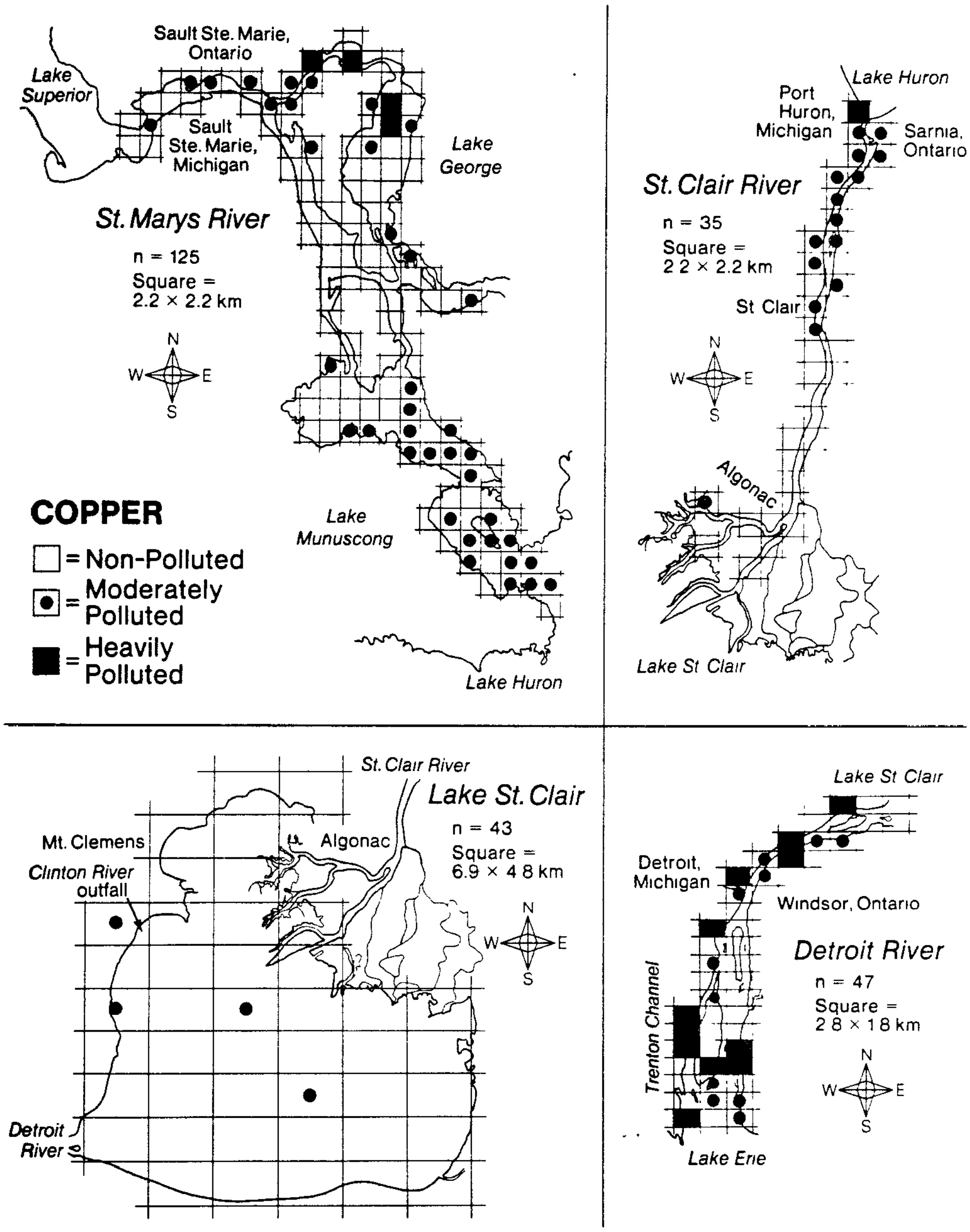


Figure 4.. Copper contamination of sediments in the upper Great Lakes connecting channels in 1985, according to USEPA guidelines (IJC 1982).

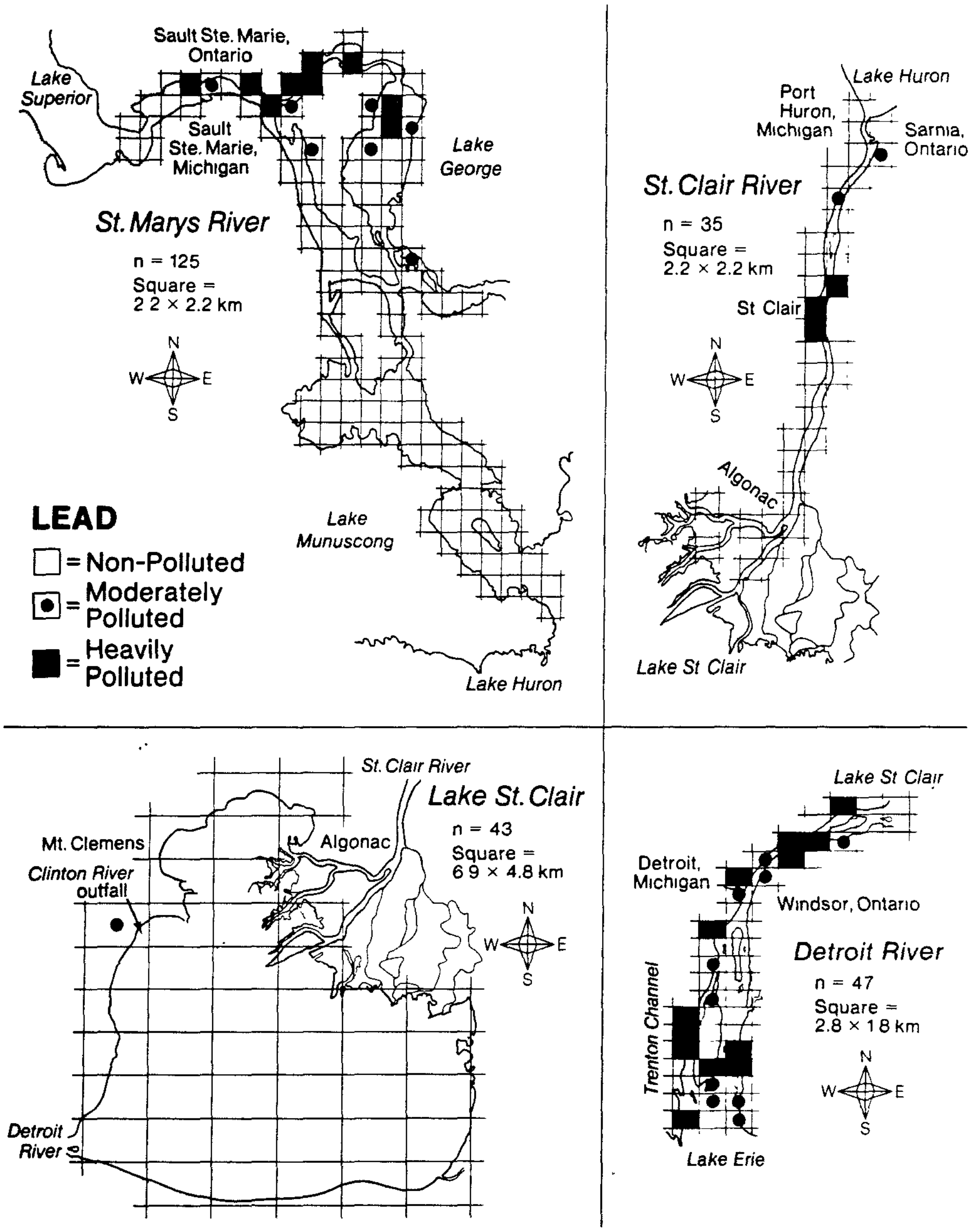


Figure 5. Lead contamination of sediments in the upper Great Lakes connecting channels in 1985, according to USEPA guidelines (IJC 1982).

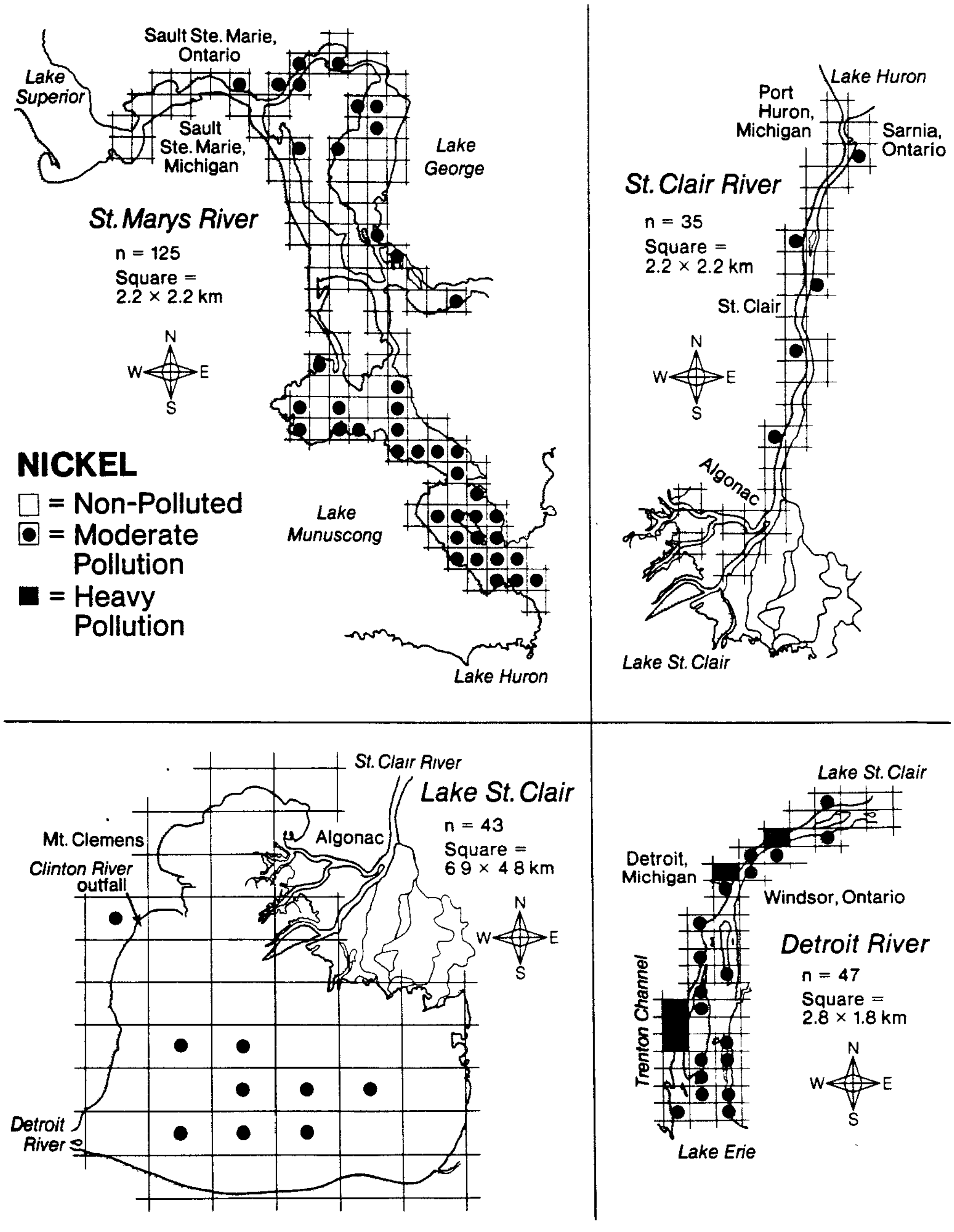


Figure 6. Nickel contamination of sediments in the upper Great Lakes connecting channels in 1985, according to USEPA guidelines (IJC 1982).

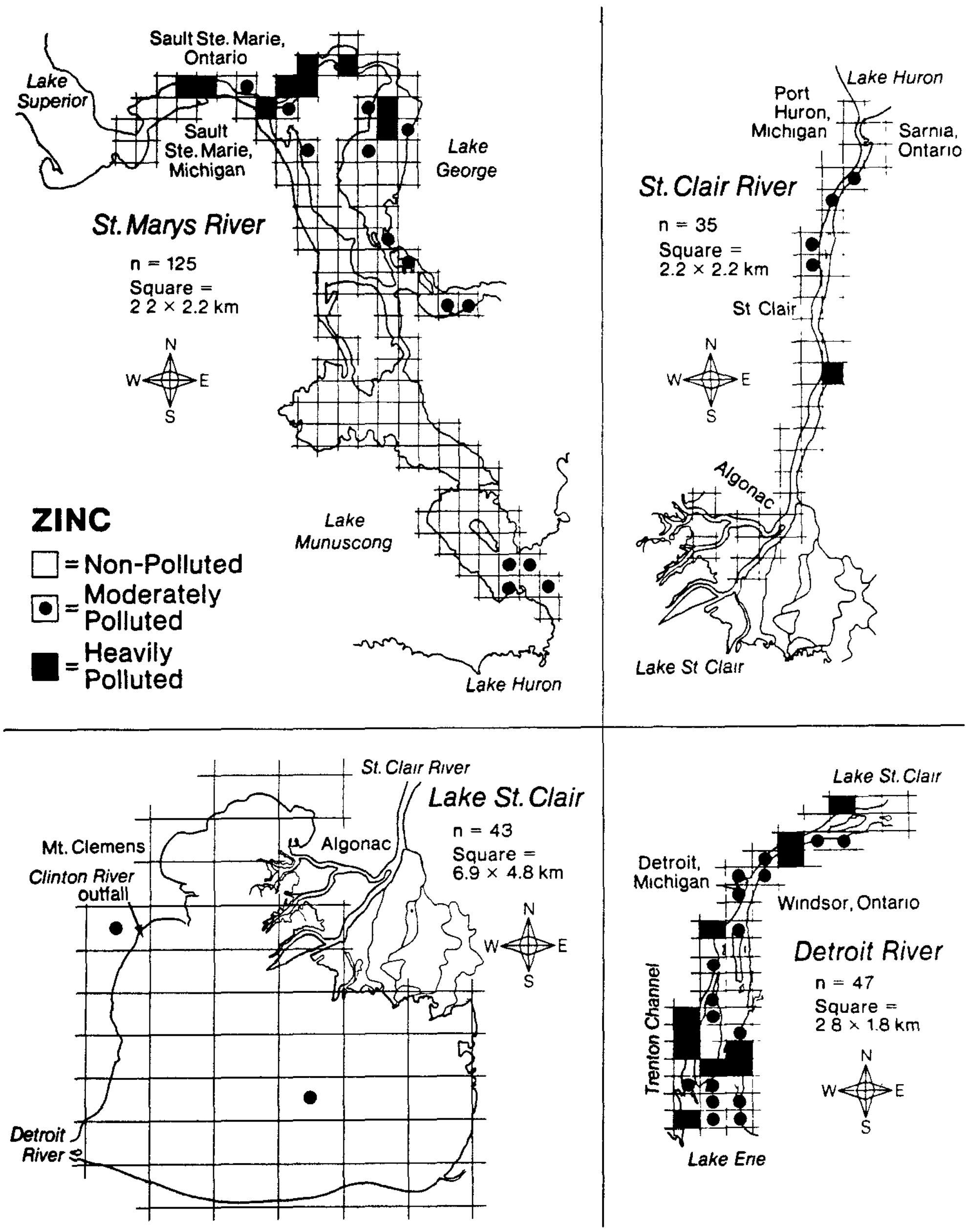


Figure 7. Zinc contamination of sediments in the upper Great Lakes connecting channels in 1985, according to USEPA guidelines (IJC 1982).

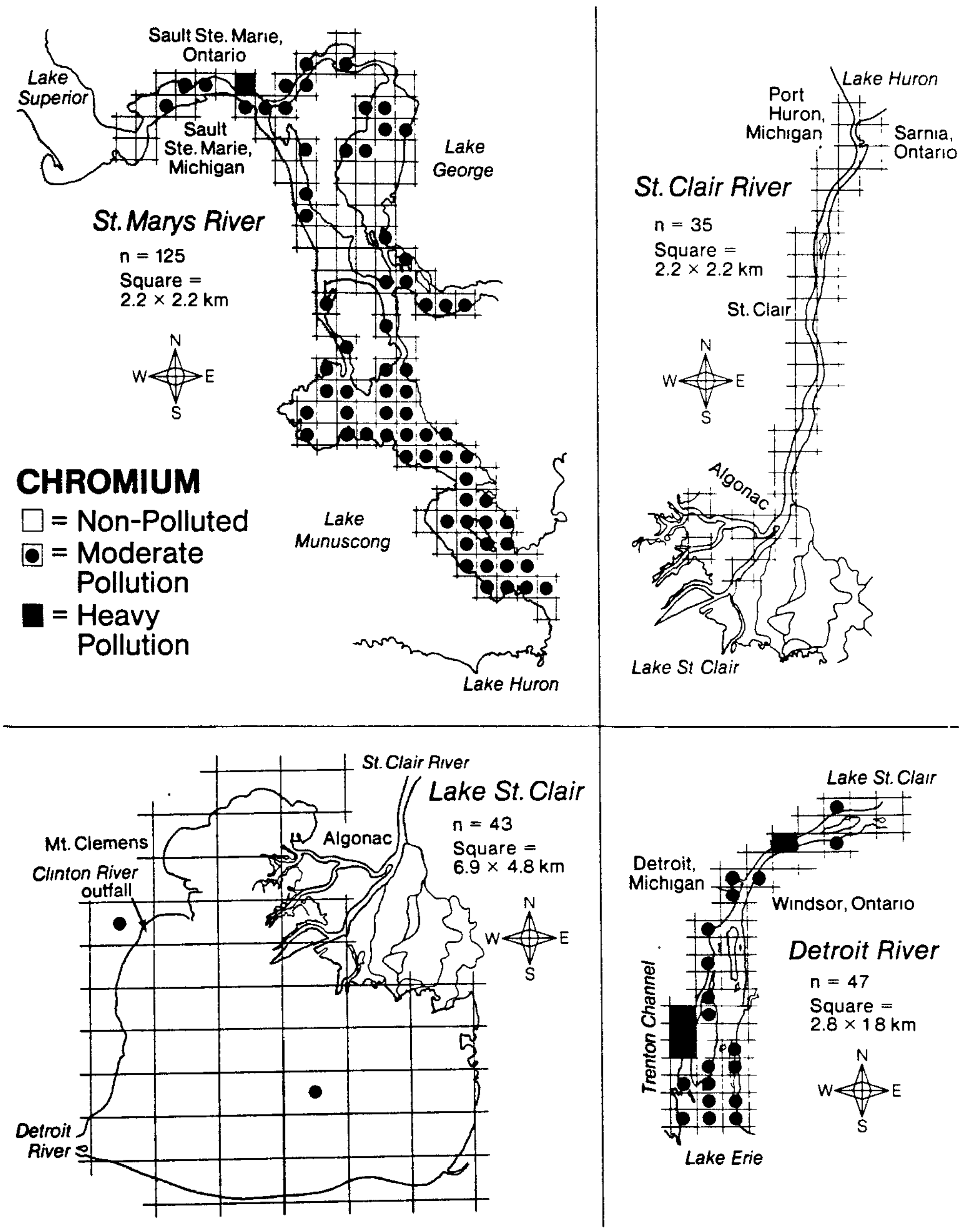


Figure 8. Chromium contamination of sediments in the upper Great Lakes connecting channels in 1985, according to USEPA guidelines (IJC 1982).

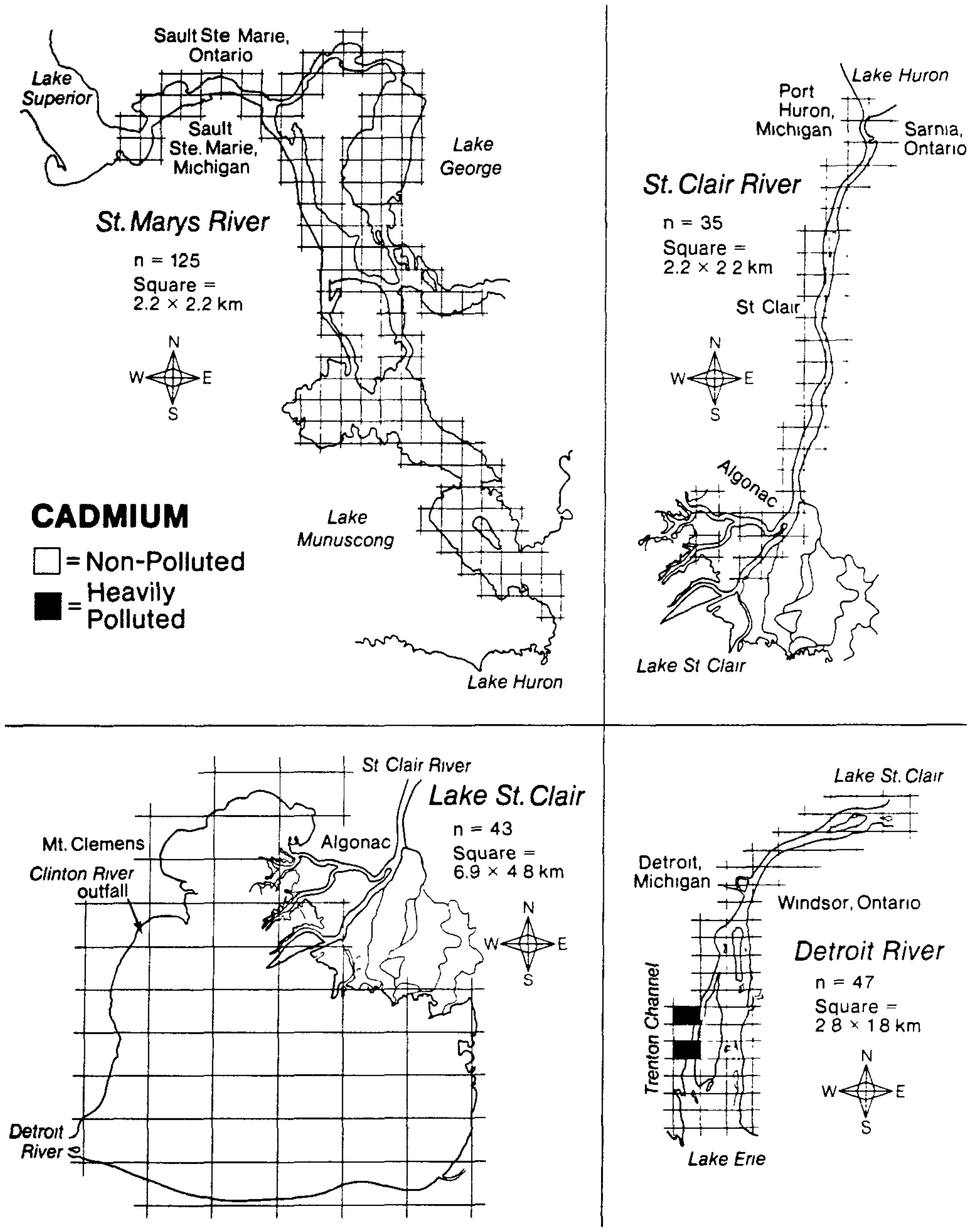


Figure 9. Cadmium contamination of sediments in the upper Great Lakes connecting channels in 1985, according to USEPA guidelines (IJC 1982).

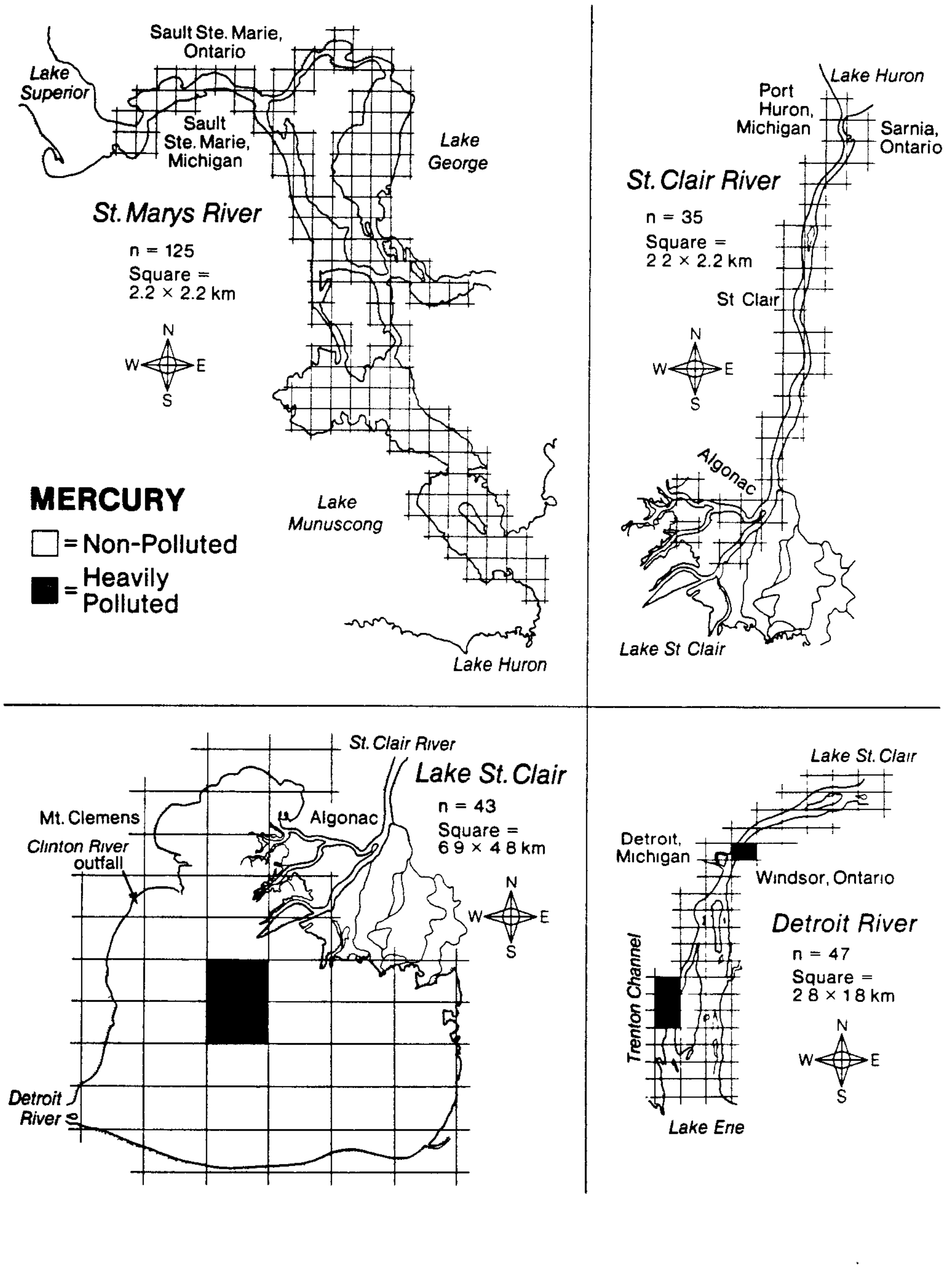


Figure 10. Mercury contamination of sediments in the upper Great Lakes connecting channels in 1985, according to USEPA guidelines (IJC 1982).

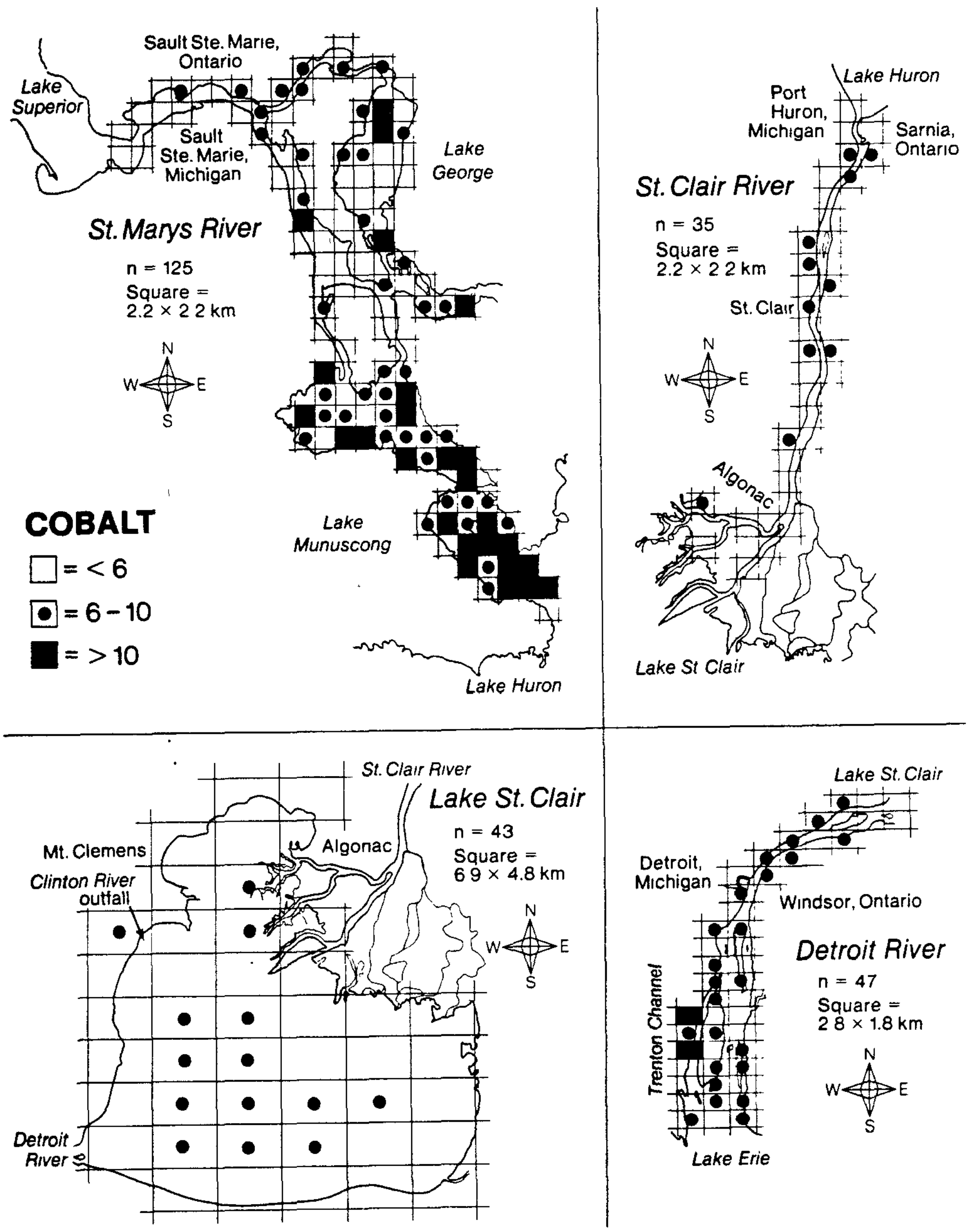


Figure 11. Cobalt contamination in the sediments of the upper Great Lakes connecting channels in 1985.

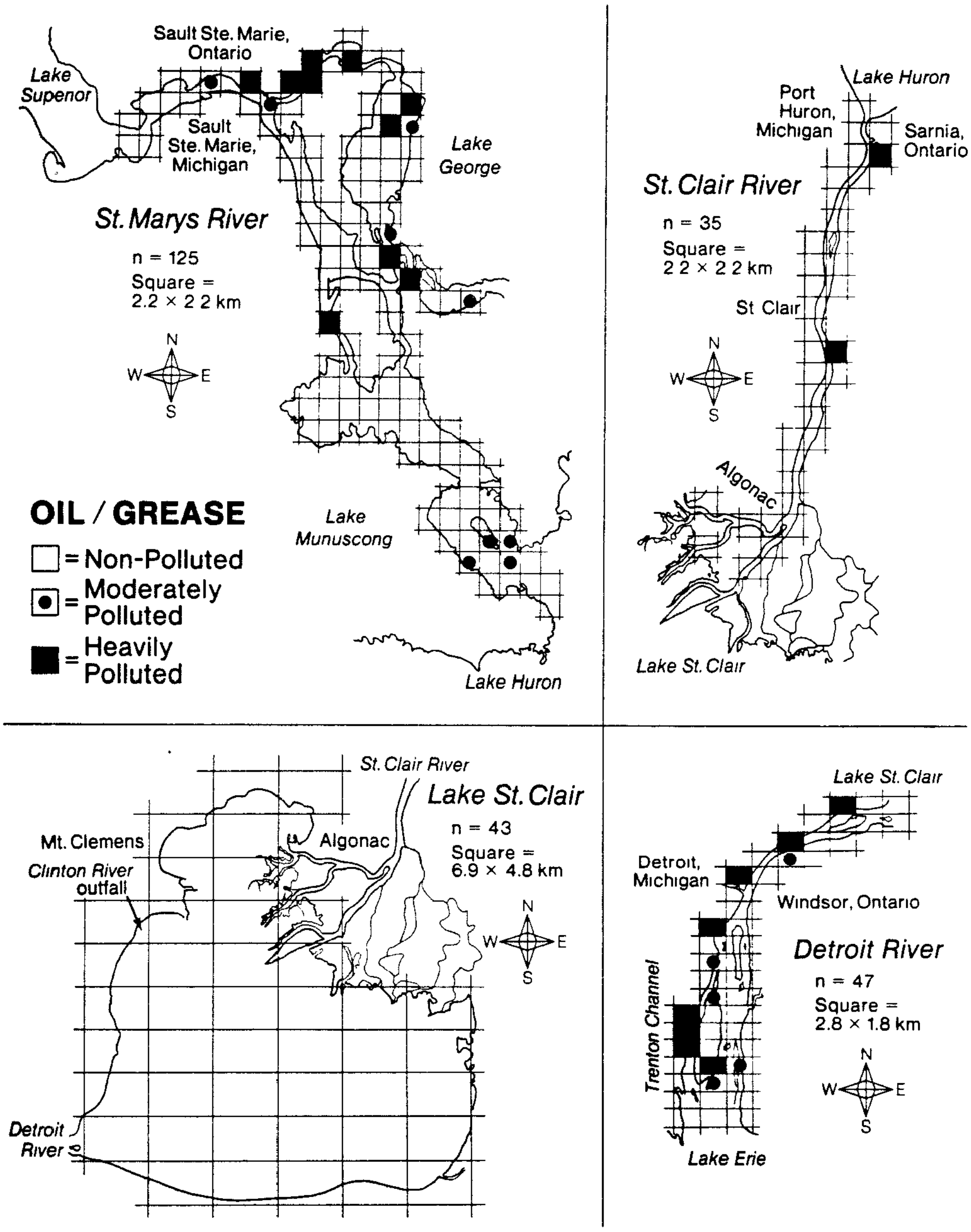


Figure 12. Oil and grease contamination of sediments in the upper Great Lakes connecting channels in 1985, according to USEPA guidelines (IJC 1982).

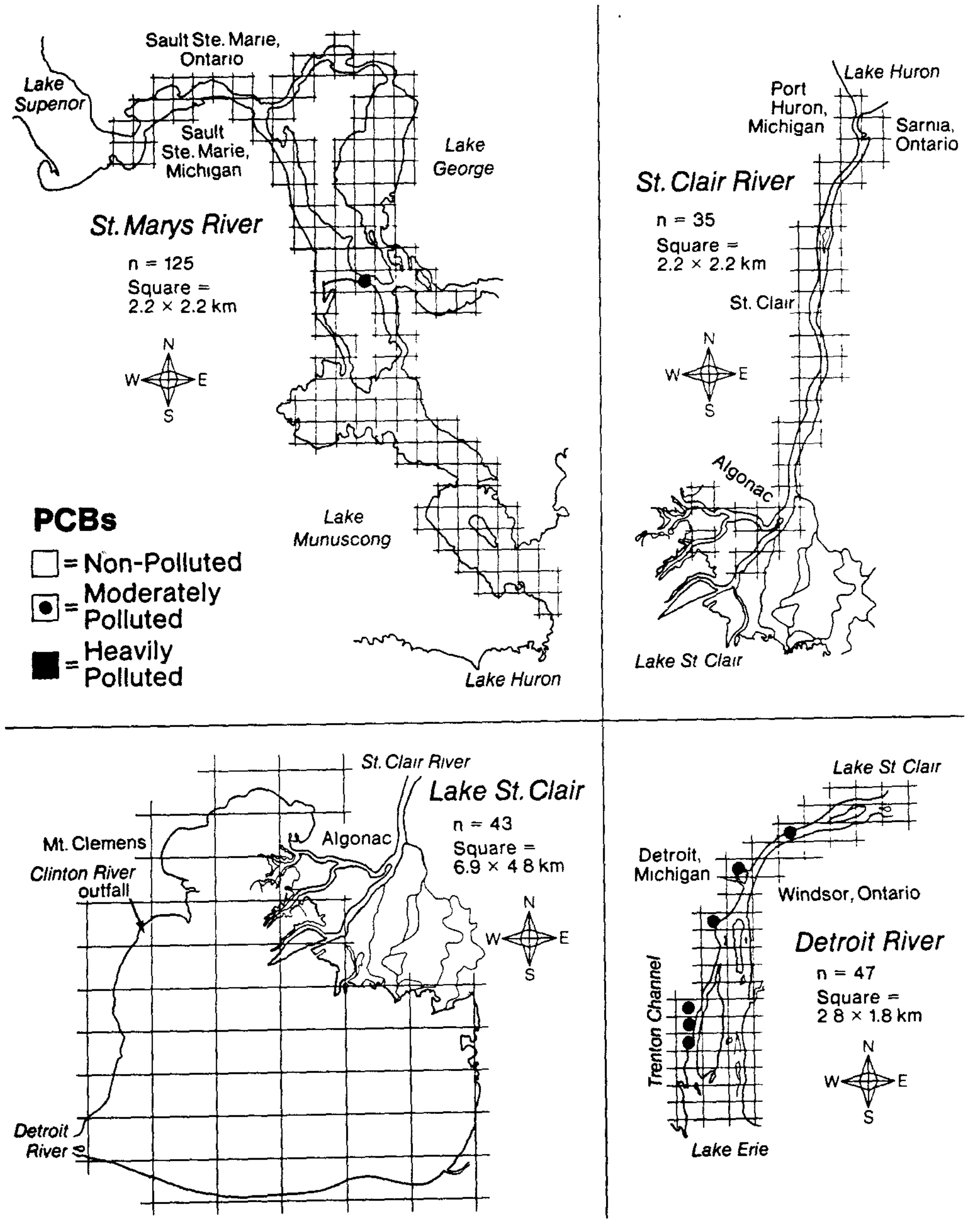


Figure 13. PCBs contamination of sediments in the upper Great Lakes connecting channels in 1985, according to USEPA guidelines (IJC 1982).

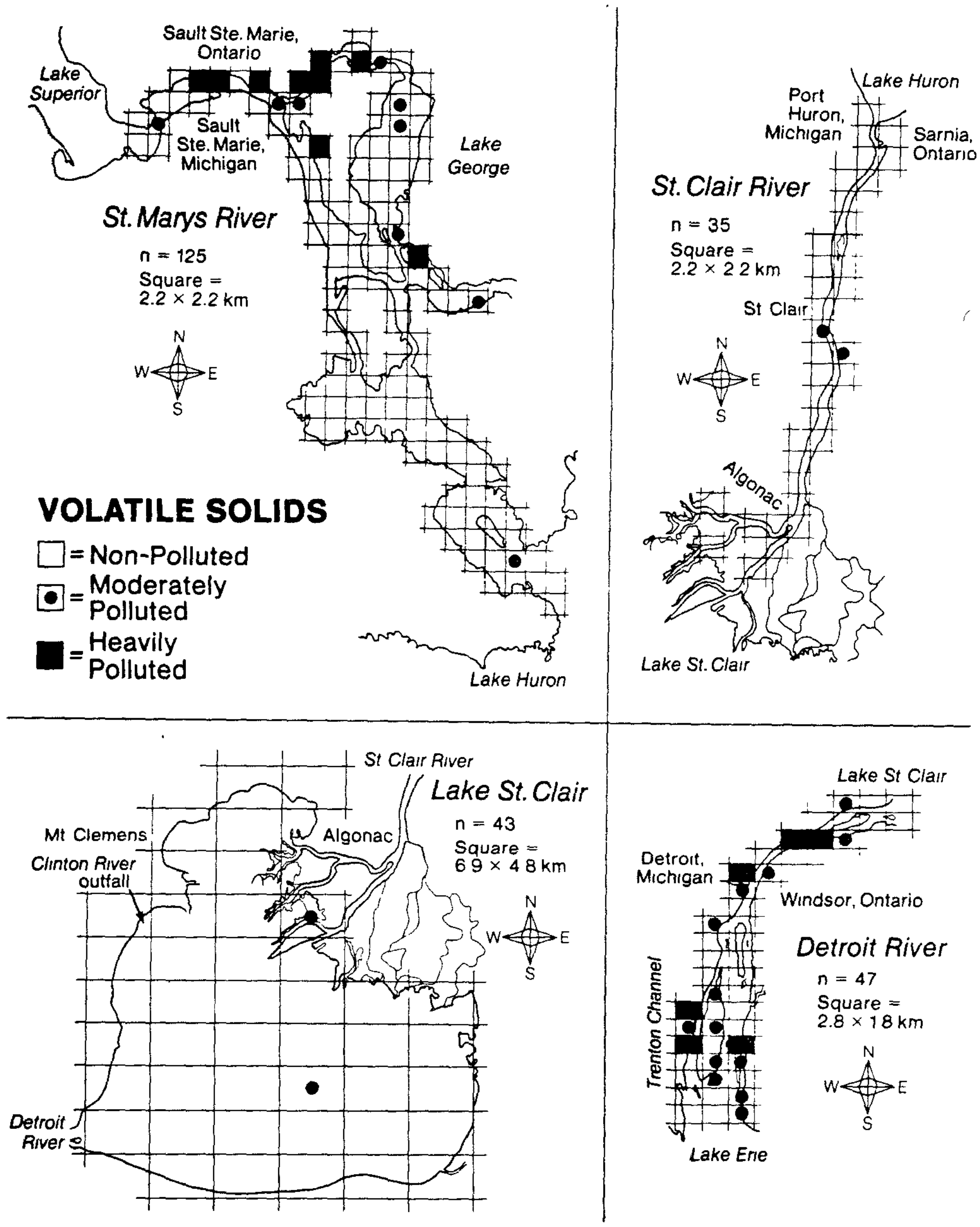


Figure 14. Volatile solids contamination of sediments in the upper Great Lakes connecting channels in 1985, according to USEPA guidelines (IJC 1982).

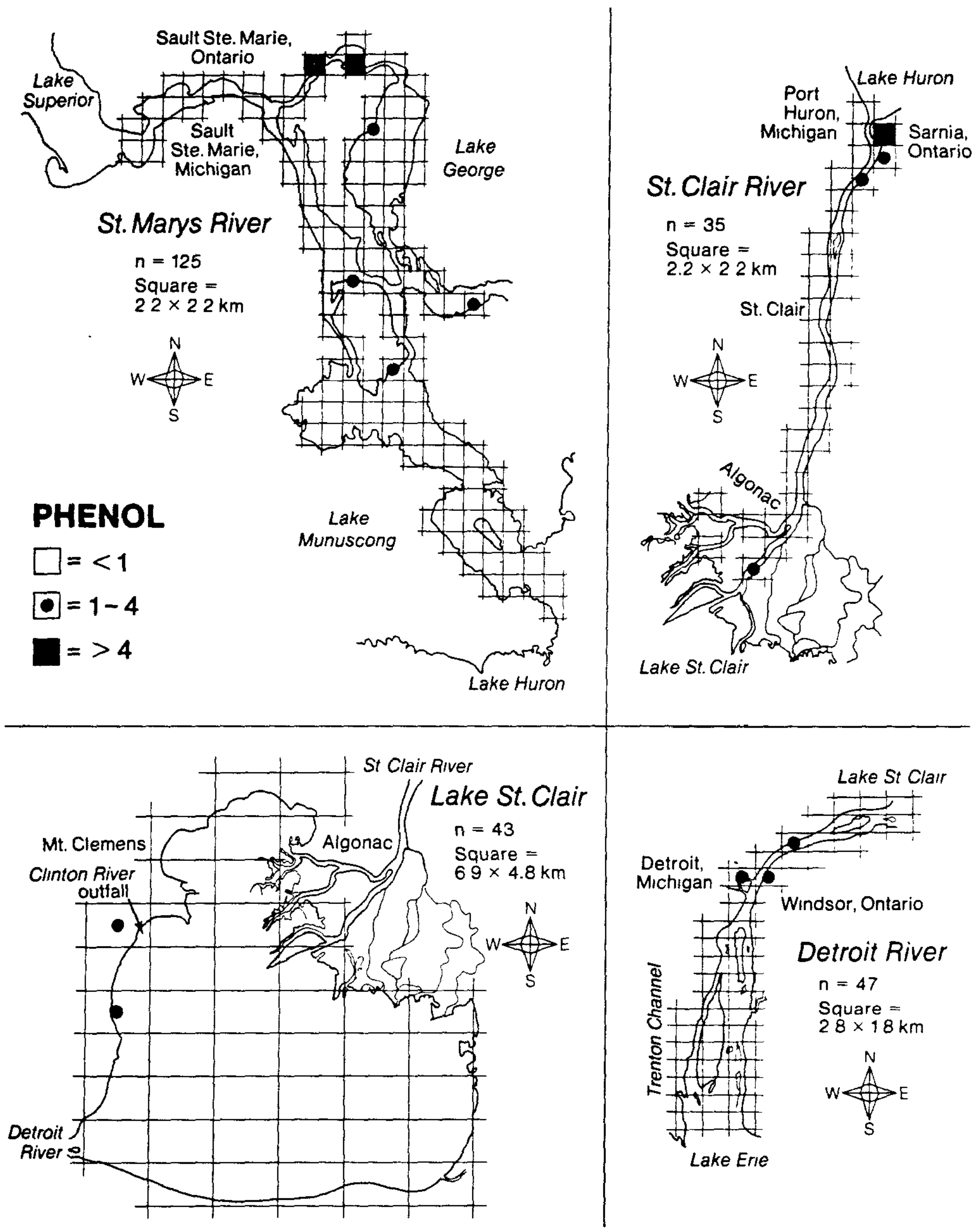


Figure 15. Phenol contamination of sediments in the upper Great Lakes connecting channels in 1985.

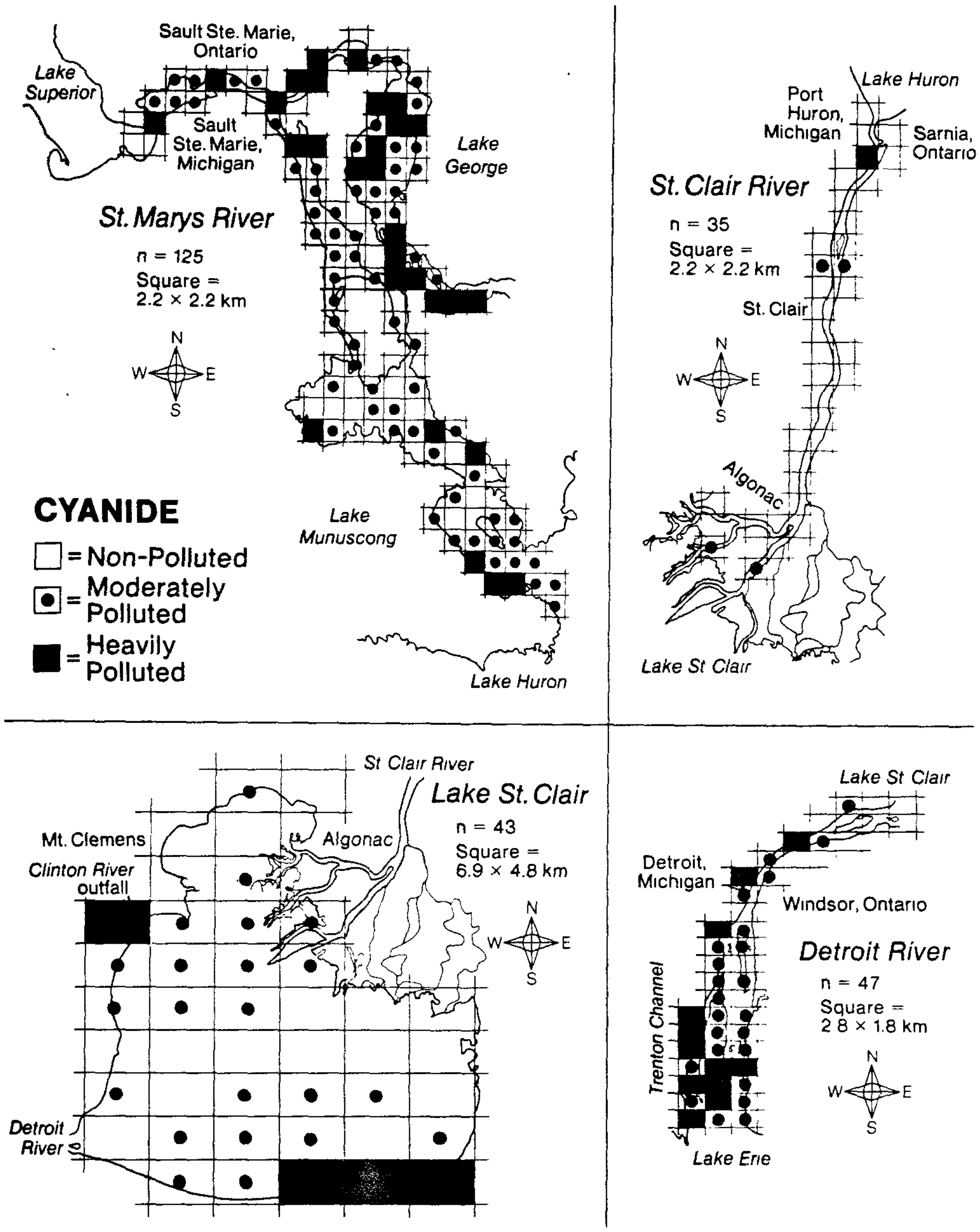
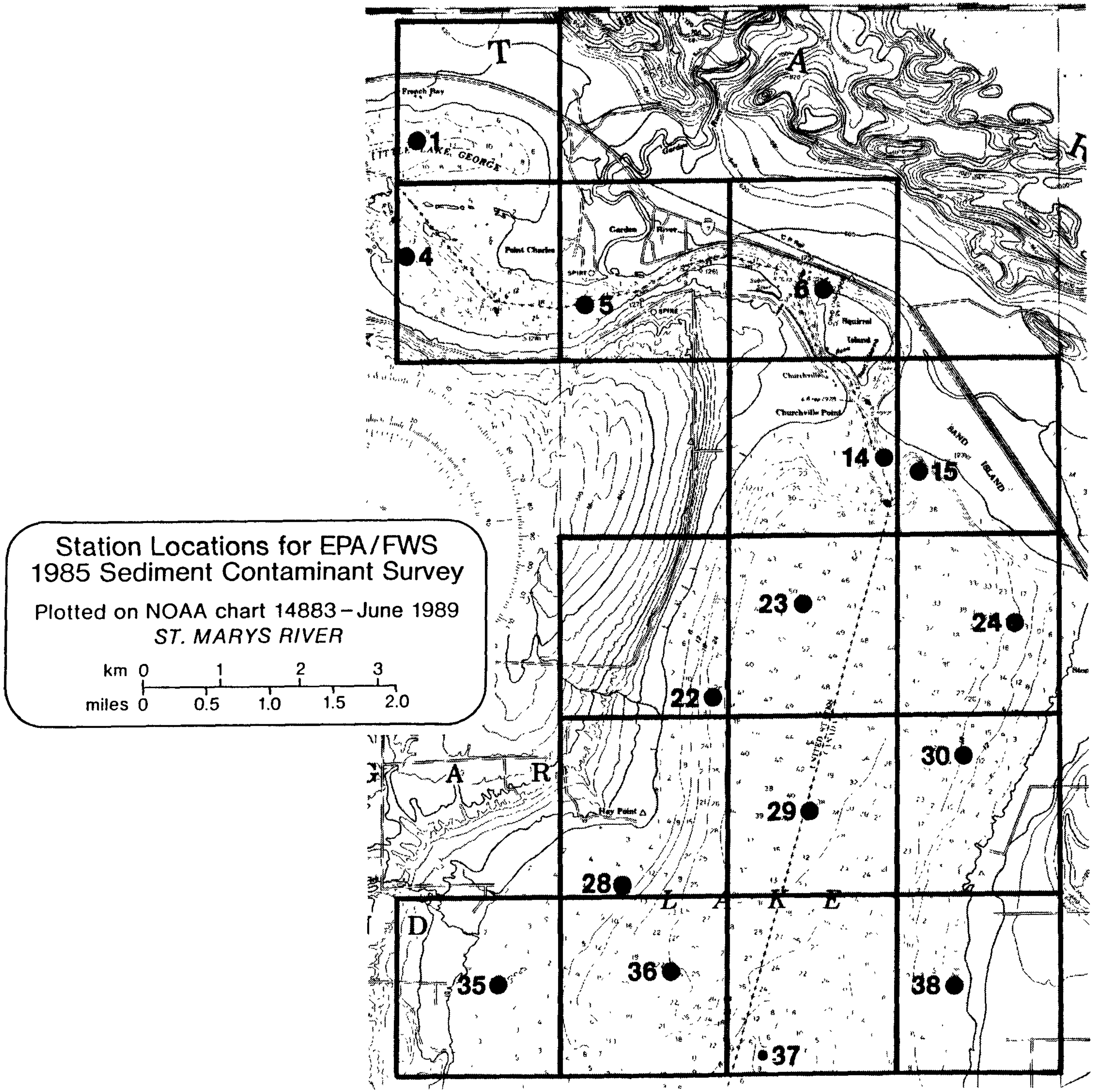


Figure 16. Cyanide contamination of sediments in the upper Great Lakes connecting channels in 1985, according to USEPA guidelines (IJC 1982).

Appendix 1. *Locations of 250 stations in the Great Lakes upper connecting channels where sediment samples were collected in 1985. Stations 1-125 are in the St. Marys River, 126-158 in the St. Clair River, 159-203 in Lake St. Clair, and 204-250 in the Detroit River. Base maps are photocopies of National Ocean Survey Charts, of the National Atmospheric and Oceanic Agency, U.S. Department of Commerce.*


Station Locations for EPA/FWS
1985 Sediment Contaminant Survey
Plotted on NOAA chart 14883–June 1989
ST. MARYS RIVER
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miles 0 0.5 1.0 1.5 2.0
1
4
5
6
14
15
22
23
24
28
29
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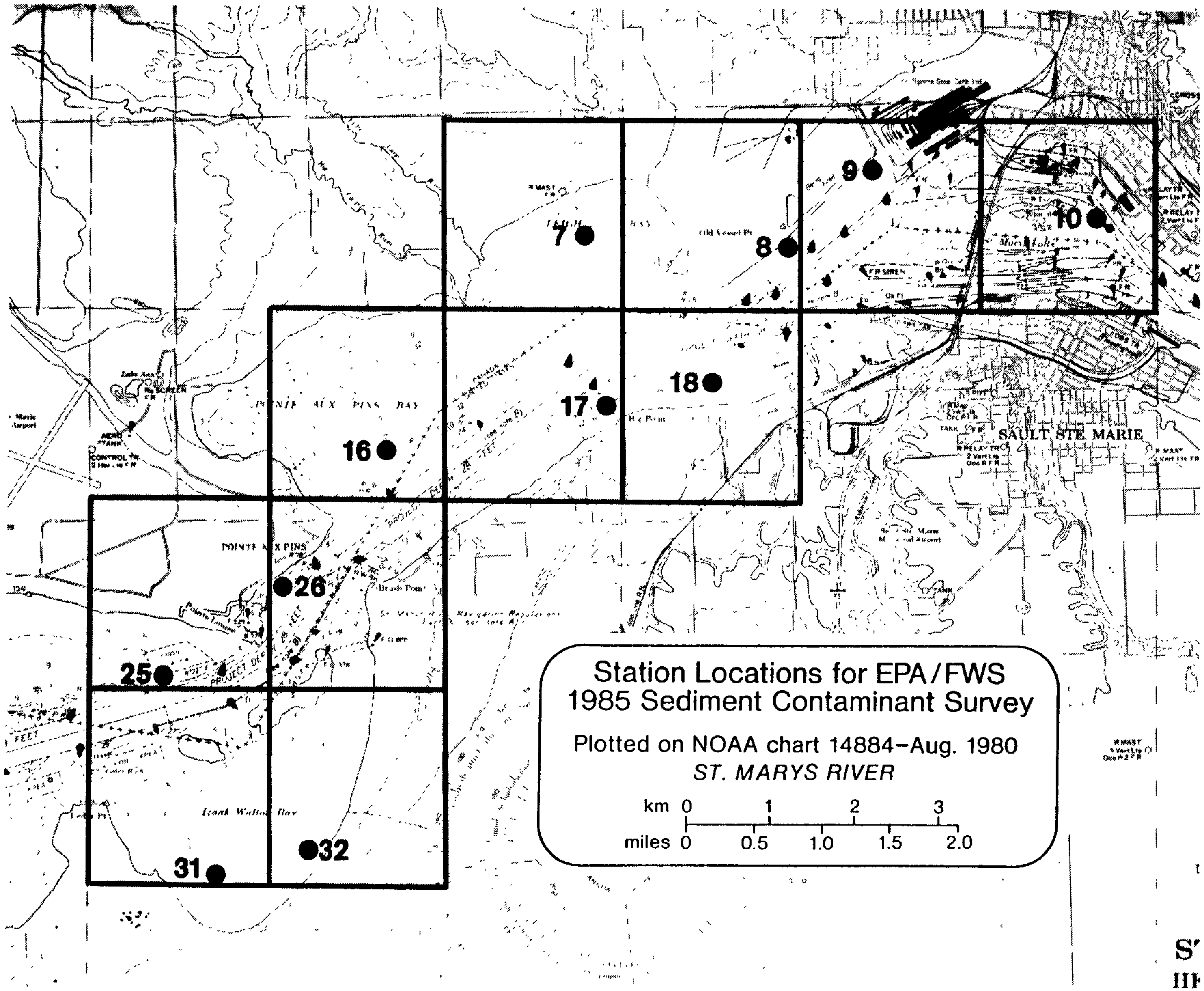
35
36
37
38
Point Charles
Squirrel Island
Churchville Point
SAND ISLAND
Hay Point
L A K E



Station Locations for EPA/FWS
1985 Sediment Contaminant Survey

Plotted on NOAA chart 14884–Aug. 1980
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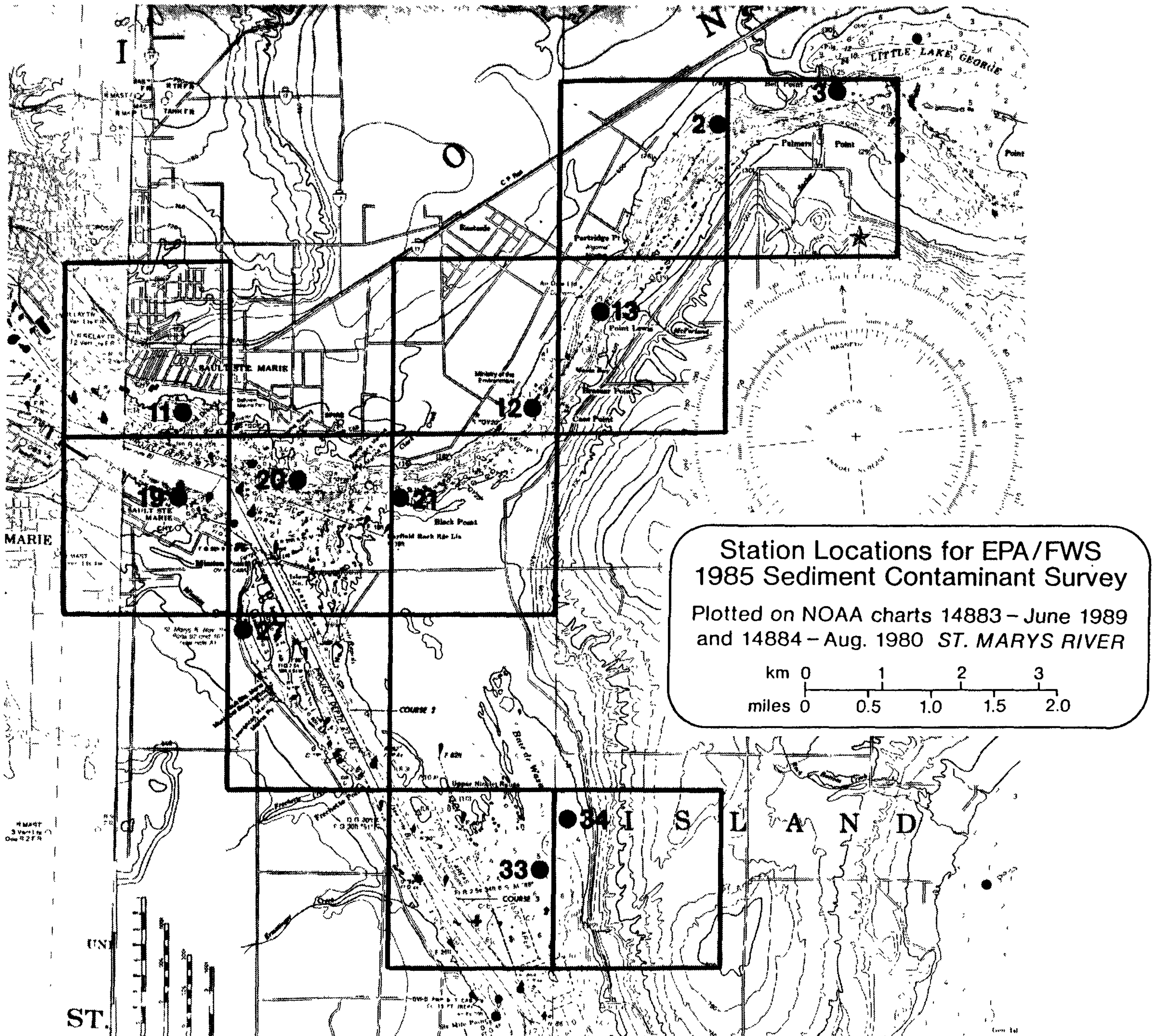

Station Locations for EPA/FWS
1985 Sediment Contaminant Survey
Plotted on NOAA charts 14883 – June 1989
and 14884 – Aug. 1980 ST. MARYS RIVER
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miles 0 0.5 1.0 1.5 2.0
2
3
11
12
13
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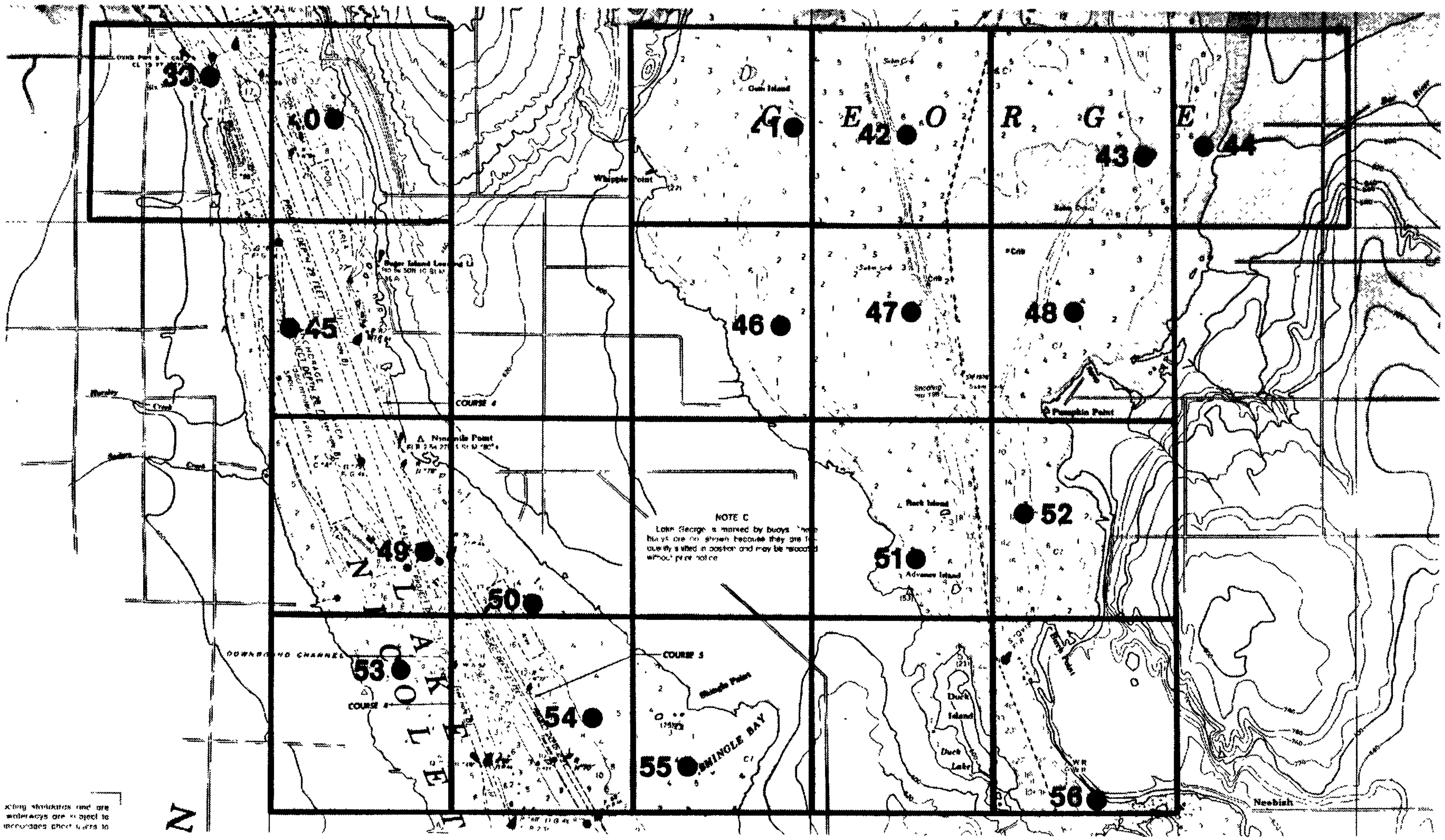
33
34
MARIE
ST.
I S L A N D
LITTLE LAKE GEORGE
SAULT STE MARIE
Black Point
Point Lewis



Station Locations for EPA/FWS
1985 Sediment Contaminant Survey

Plotted on NOAA chart 14883 – June 1989
ST. MARYS RIVER

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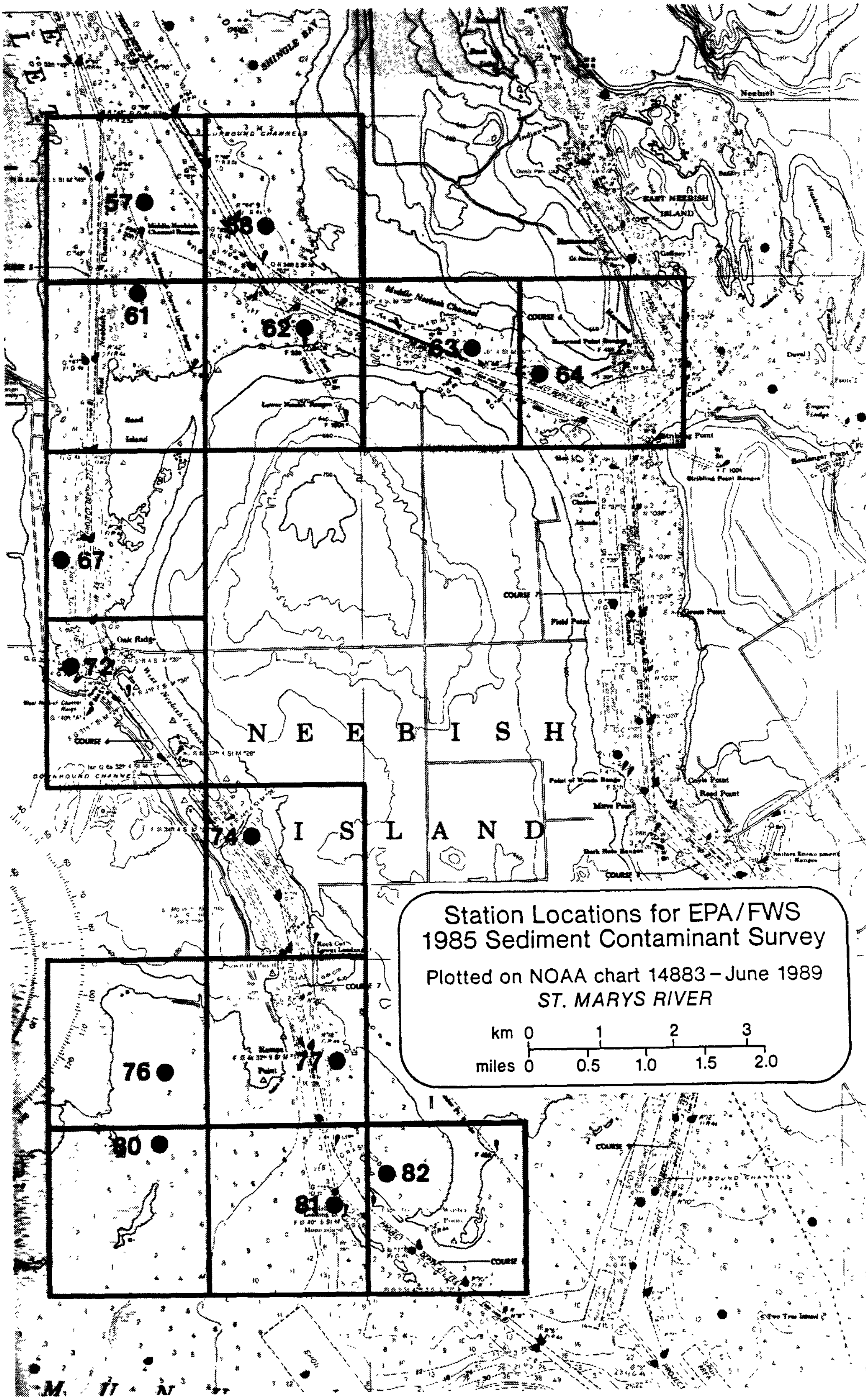
miles 0 0.5 1.0 1.5 2.0


Station Locations for EPA/FWS
1985 Sediment Contaminant Survey
Plotted on NOAA chart 14883 – June 1989
ST. MARYS RIVER
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miles 0 0.5 1.0 1.5 2.0
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ISLAND
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61
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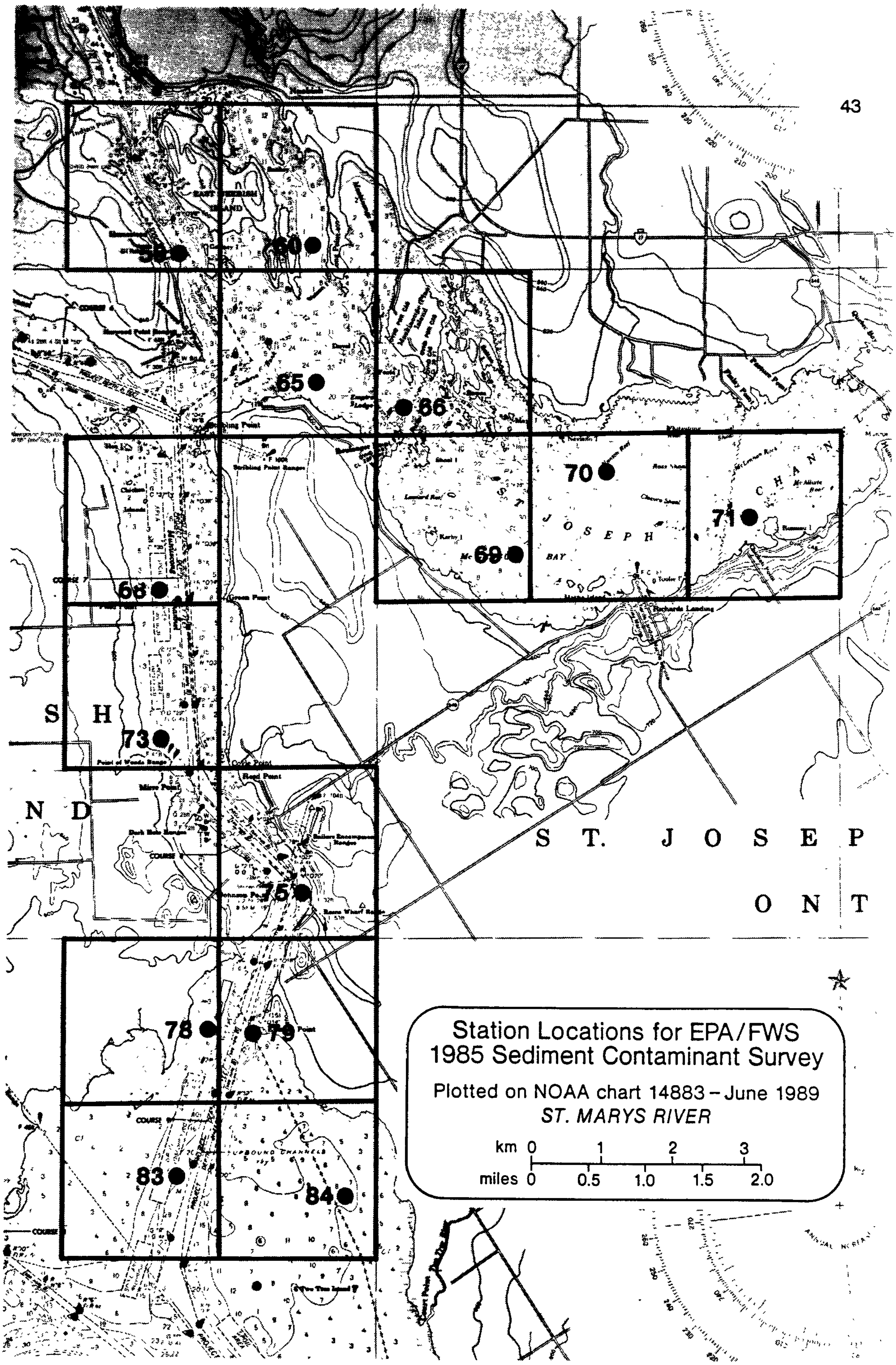
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S H
N D
ST. JOSEP
ONT
J O S E P H
BAY
C H A N N
Station Locations for EPA/FWS
1985 Sediment Contaminant Survey
Plotted on NOAA chart 14883 – June 1989
ST. MARYS RIVER
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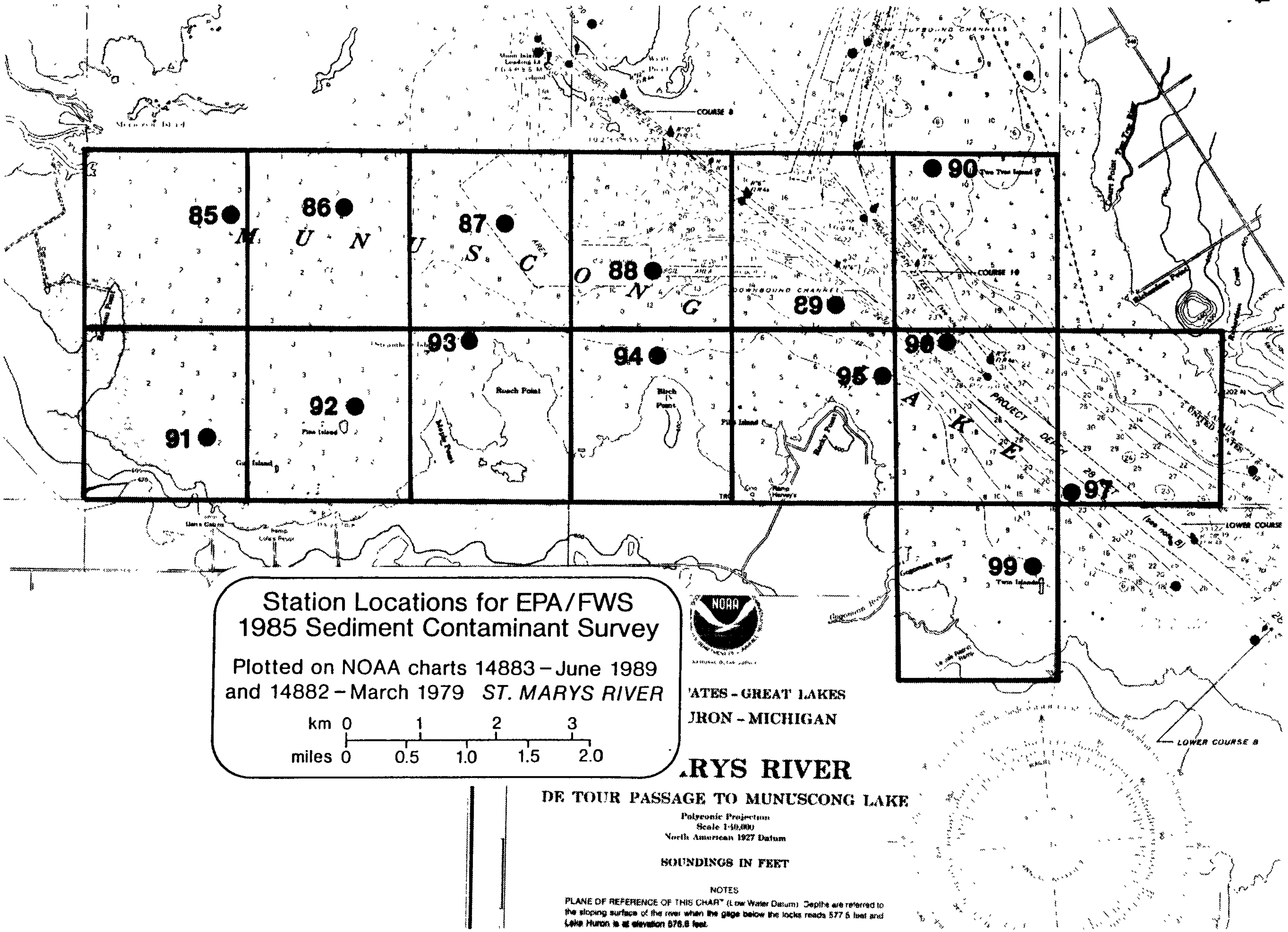
miles 0 0.5 1.0 1.5 2.0


Station Locations for EPA/FWS
1985 Sediment Contaminant Survey
Plotted on NOAA charts 14883 – June 1989
and 14882 – March 1979 ST. MARYS RIVER
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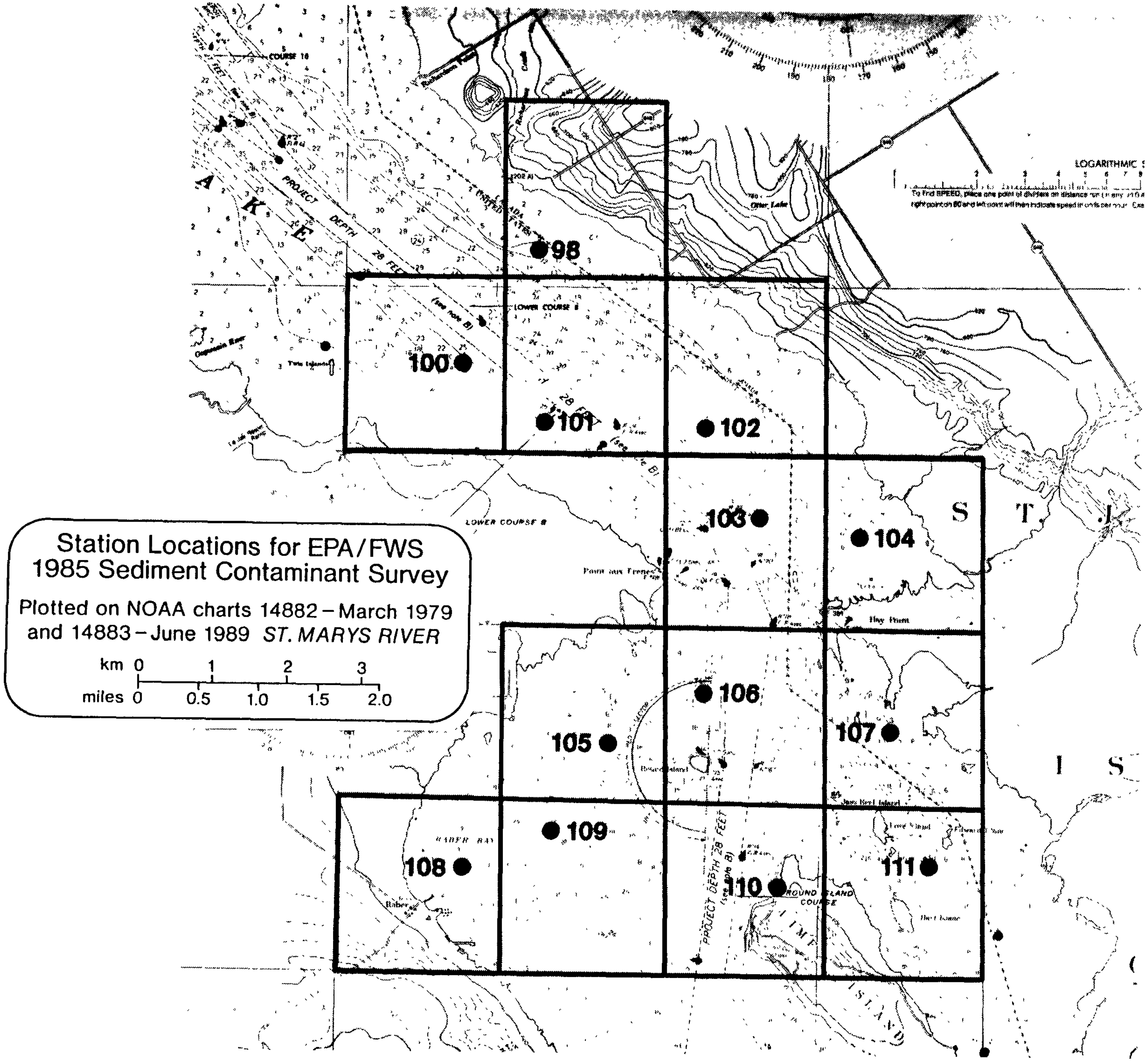
miles 0 0.5 1.0 1.5 2.0
85
86
87
88
89
90
91
92
93
94
95
96
97
99
M U N U S C O N G
L A K E
Roach Point
Pine Island
Two Tree Island
Twin Islands
COURSE 8
COURSE 10
LOWER COURSE 8
DOWNBOUND CHANNEL
PROJECT DEPTH
NOAA
'ATES - GREAT LAKES
JRON - MICHIGAN
.RYS RIVER
DE TOUR PASSAGE TO MUNUSCONG LAKE
Polyconic Projection
Scale 1:40,000
North American 1927 Datum
SOUNDINGS IN FEET
NOTES
PLANE OF REFERENCE OF THIS CHART (Low Water Datum). Depths are referred to the sloping surface of the river when the gage below the locks reads 577.5 feet and Lake Huron is at elevation 576.8 feet.


Station Locations for EPA/FWS
1985 Sediment Contaminant Survey
Plotted on NOAA charts 14882 – March 1979
and 14883 – June 1989 ST. MARYS RIVER
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miles 0 0.5 1.0 1.5 2.0
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100
101
102
103
104
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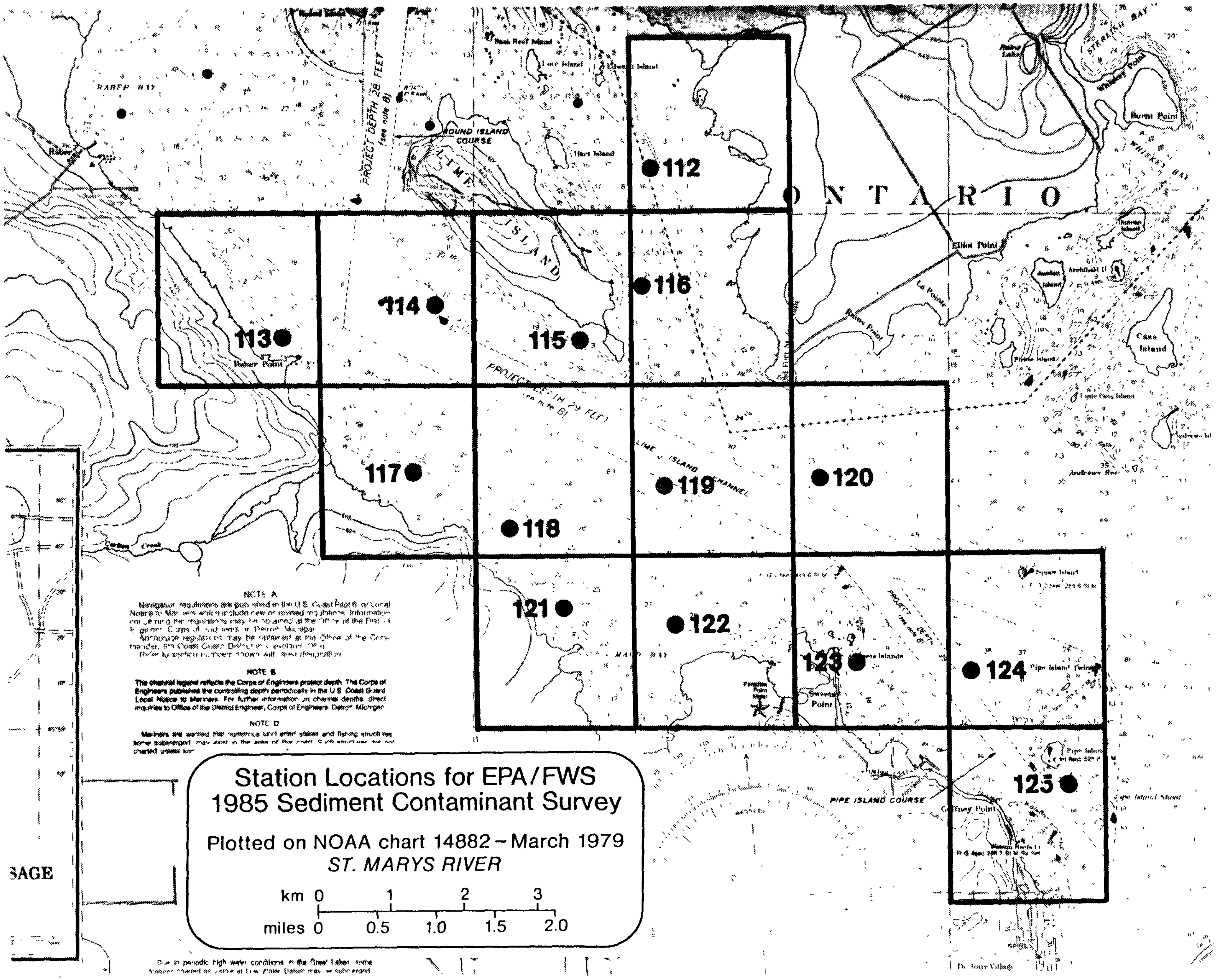
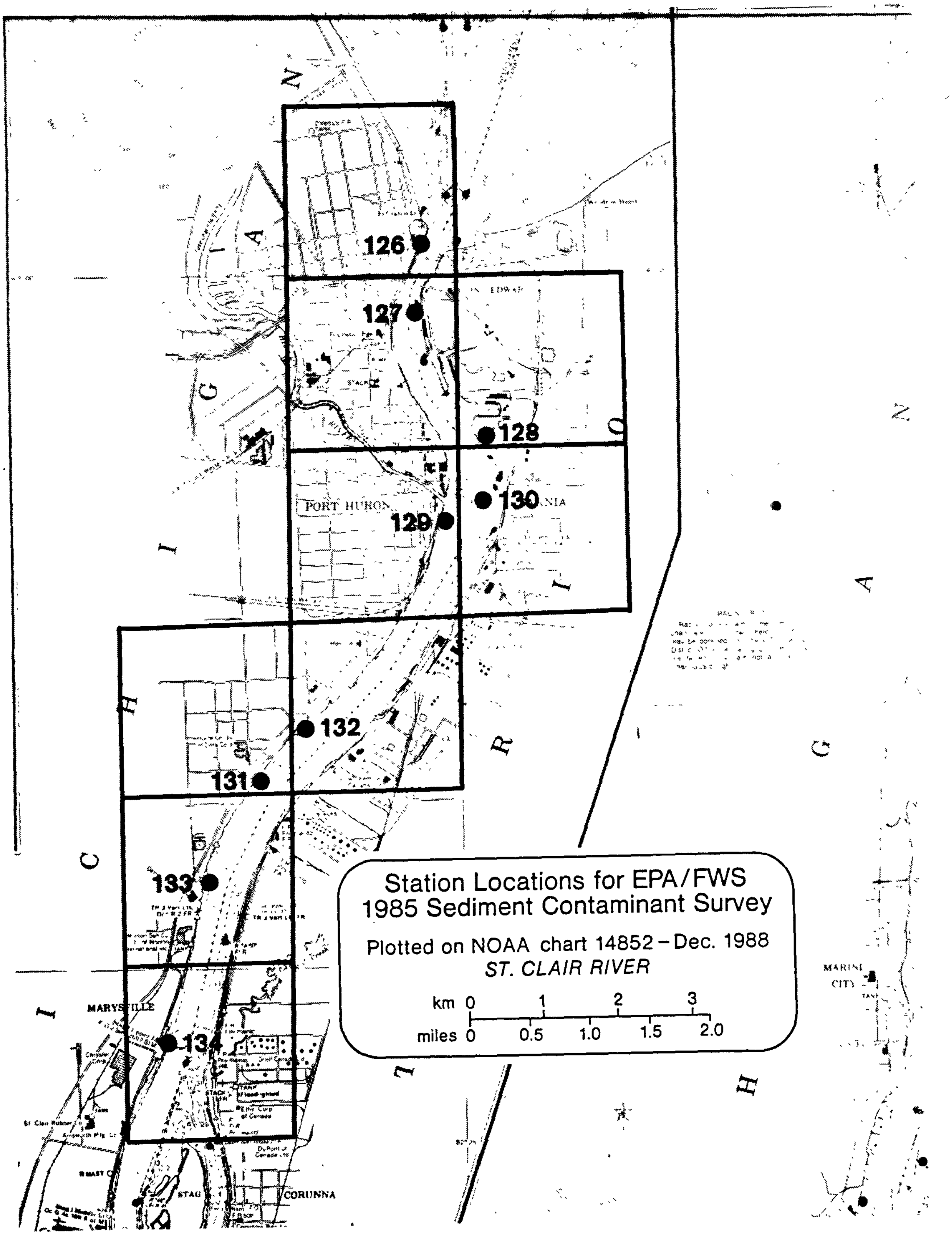
106
107
108
109
110
111
LOWER COURSE 8
PROJECT DEPTH 28 FEET
ROUND ISLAND COURSE
LOGARITHMIC S



Station Locations for EPA/FWS 1985 Sediment Contaminant Survey

Plotted on NOAA chart 14882 – March 1979
ST. MARYS RIVER


126
127
128
129
130
131
132
133
134
PORT HURON
MARYSVILLE
CORUNNA
Station Locations for EPA/FWS
1985 Sediment Contaminant Survey
Plotted on NOAA chart 14852 - Dec. 1988
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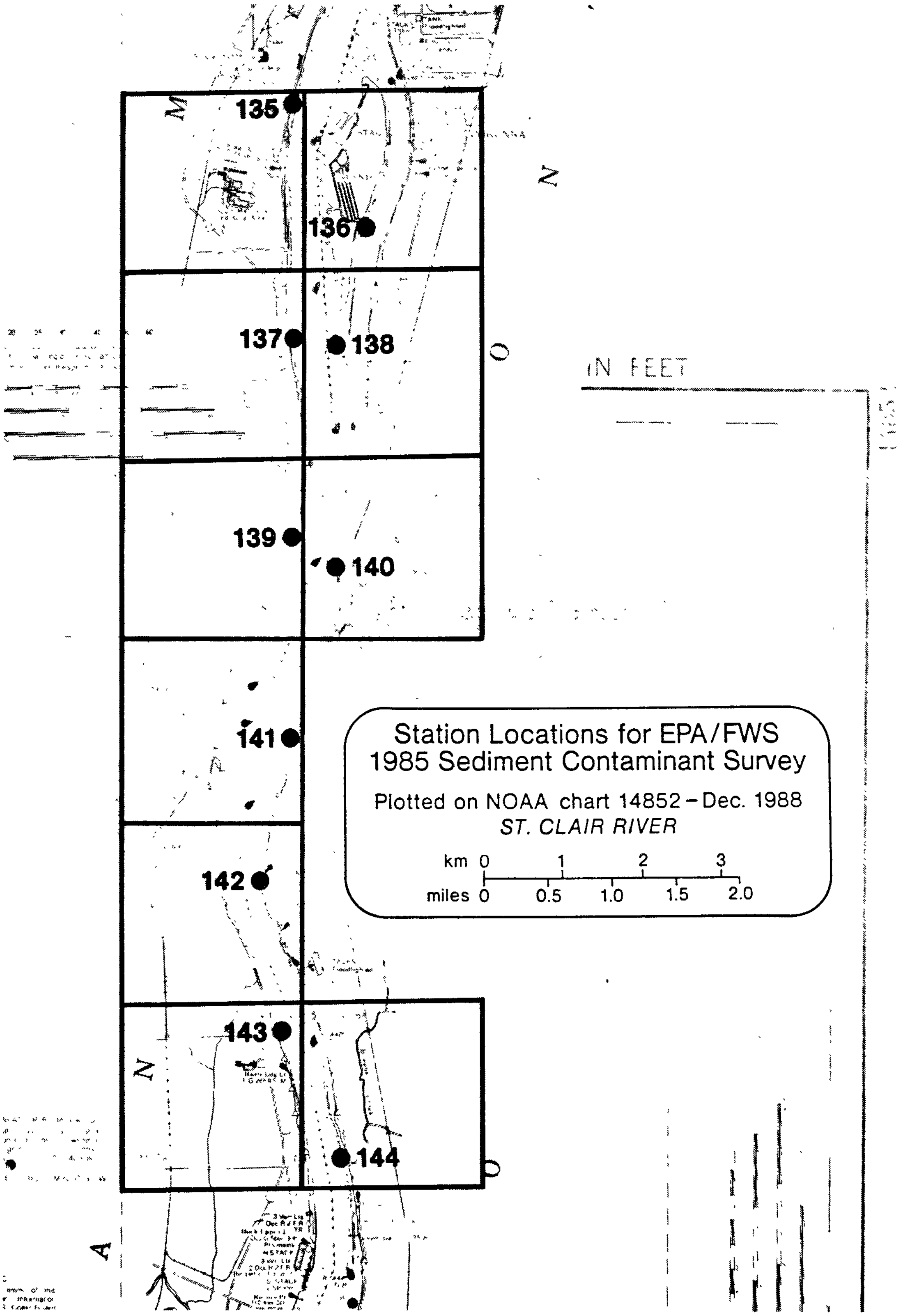
miles 0 0.5 1.0 1.5 2.0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137
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140
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142
143
144
IN FEET
Station Locations for EPA/FWS
1985 Sediment Contaminant Survey
Plotted on NOAA chart 14852 – Dec. 1988
ST. CLAIR RIVER
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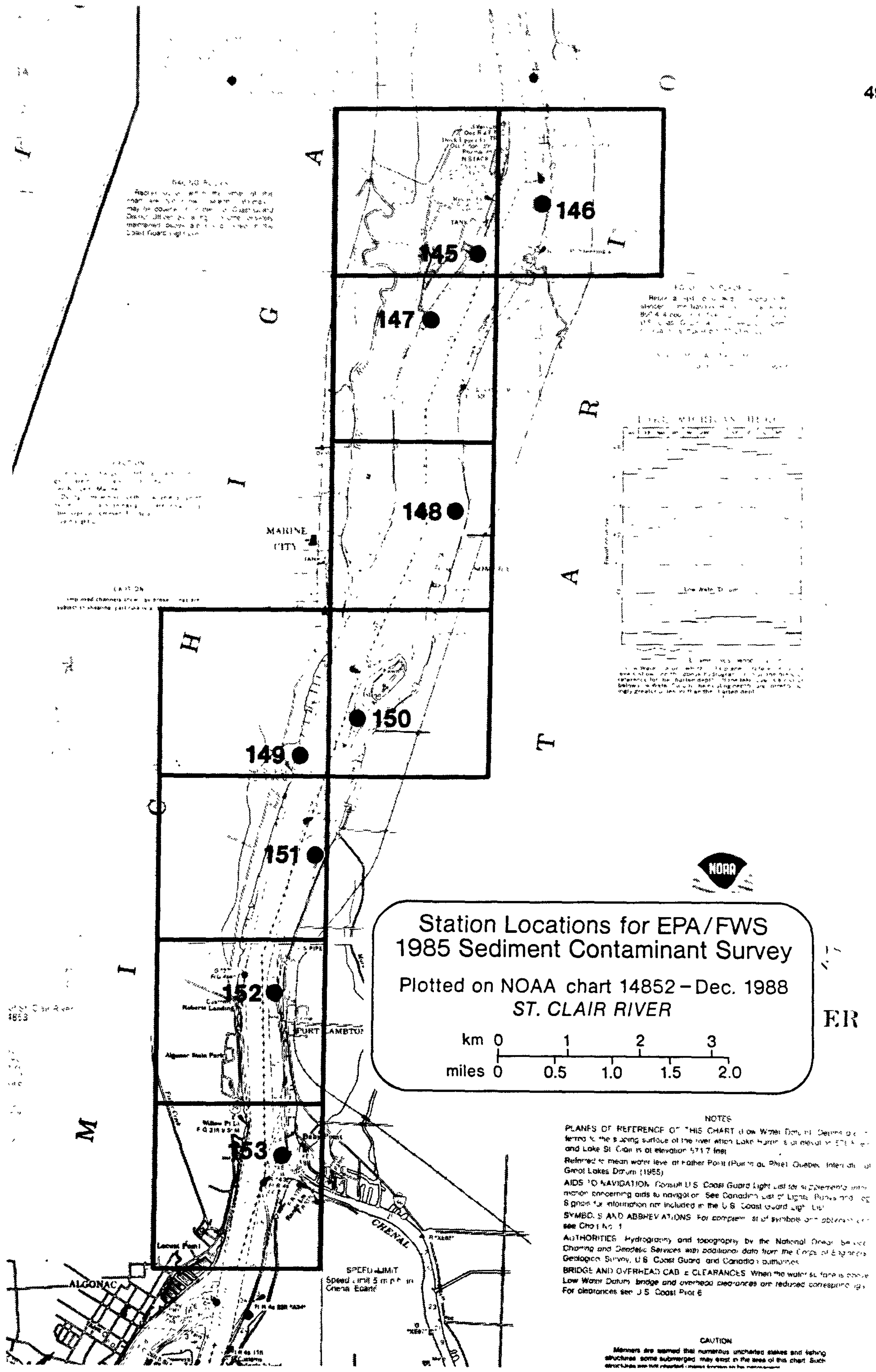
miles 0 0.5 1.0 1.5 2.0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148
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151
152
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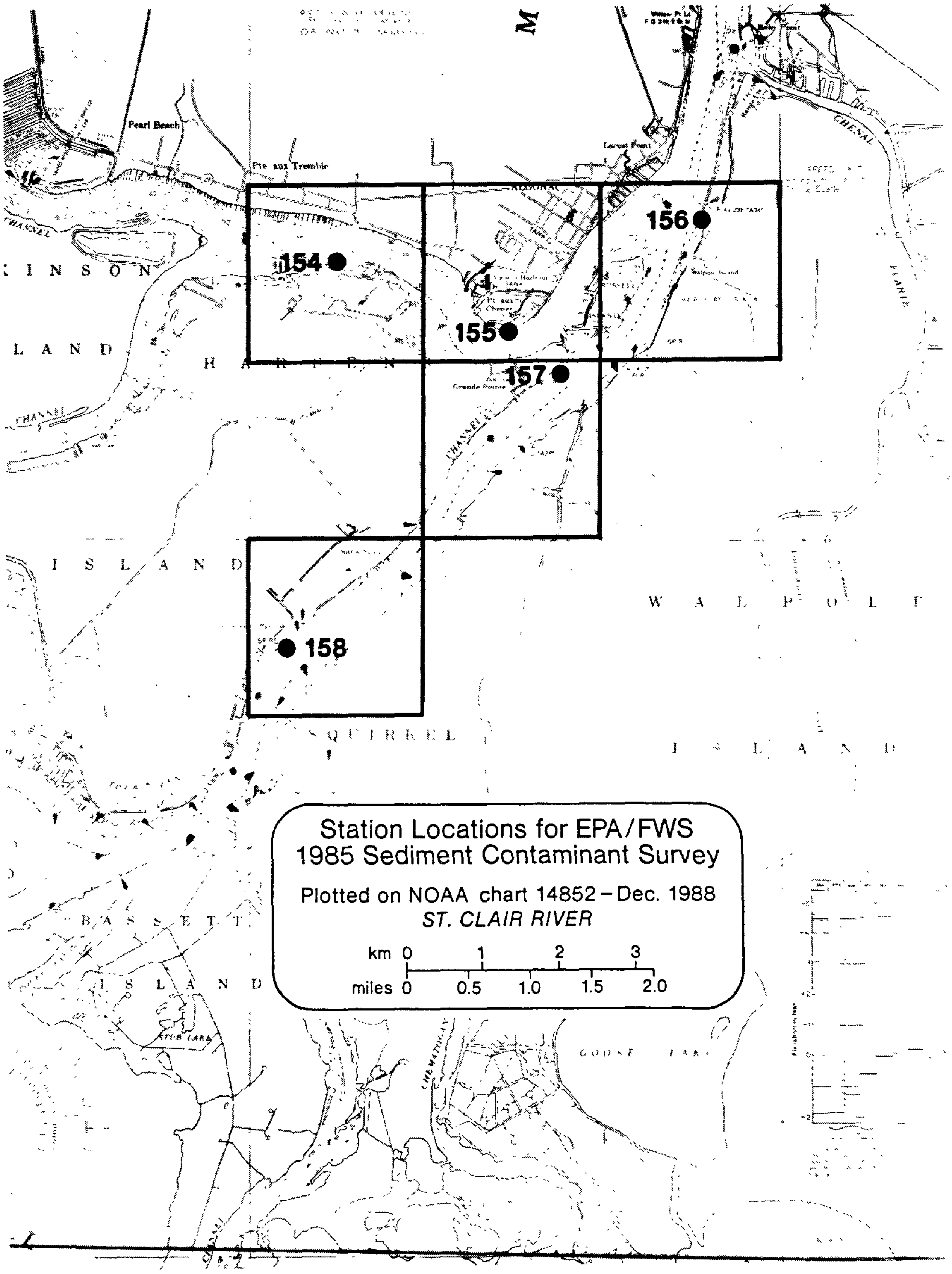
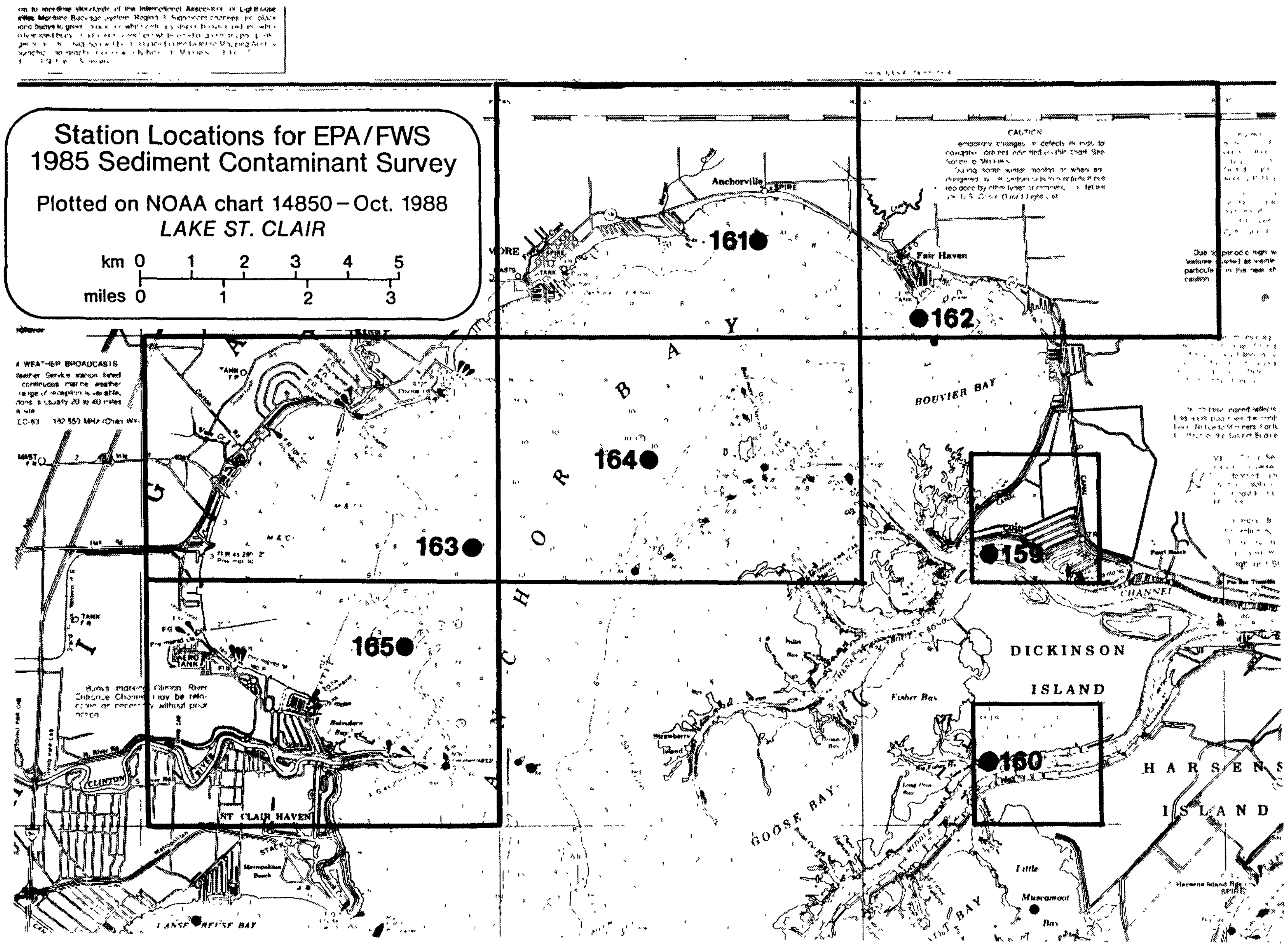
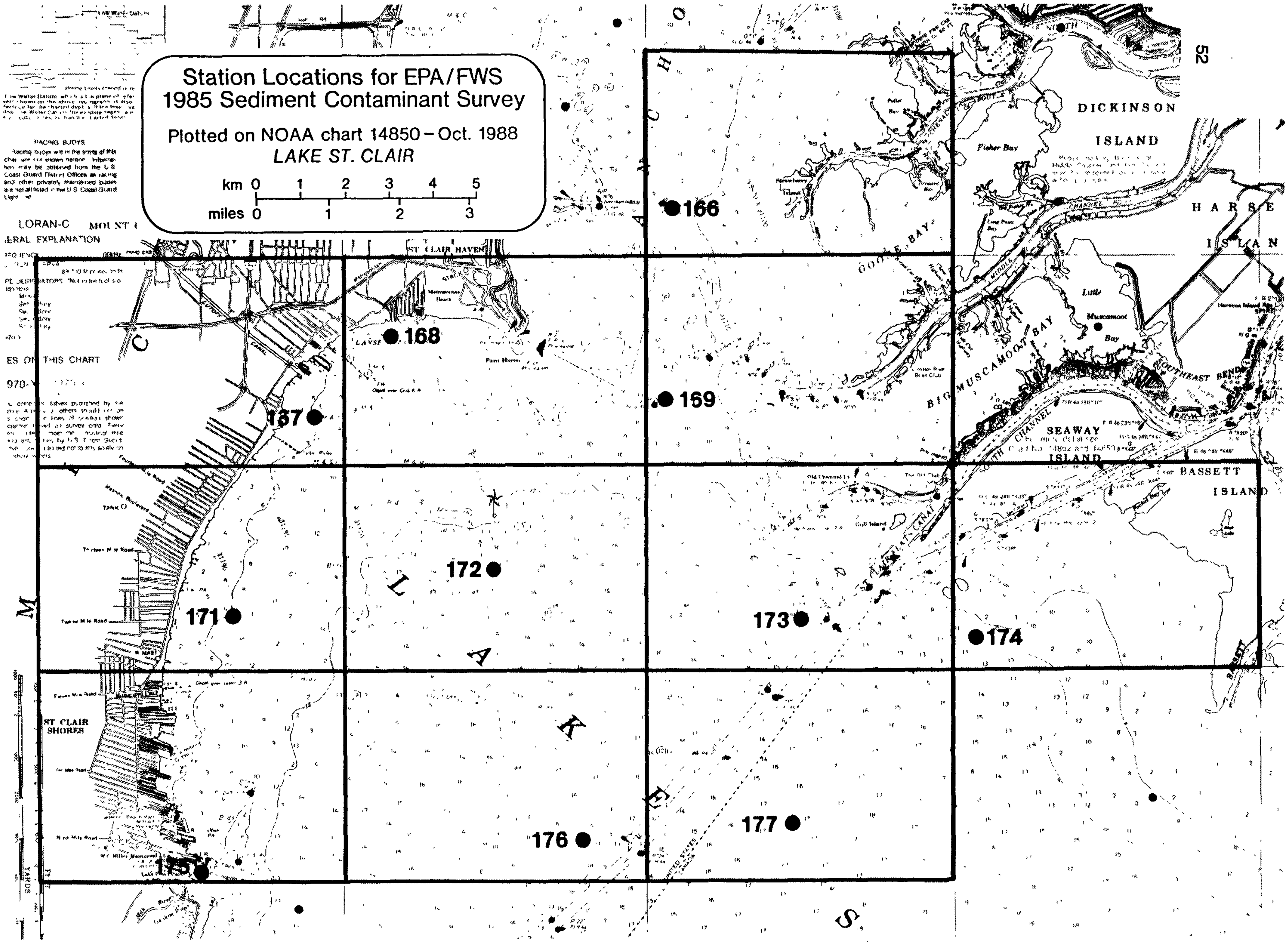
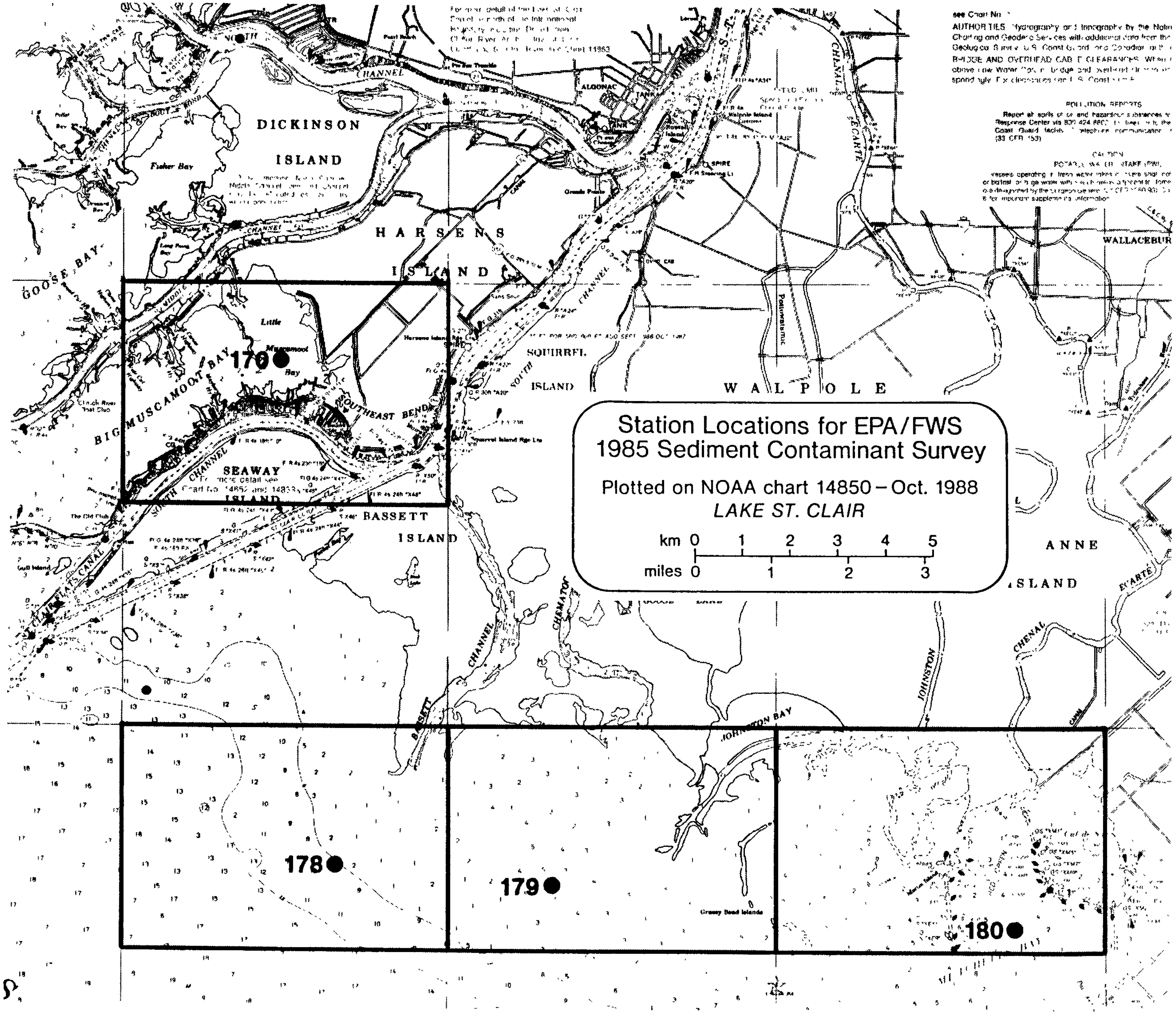
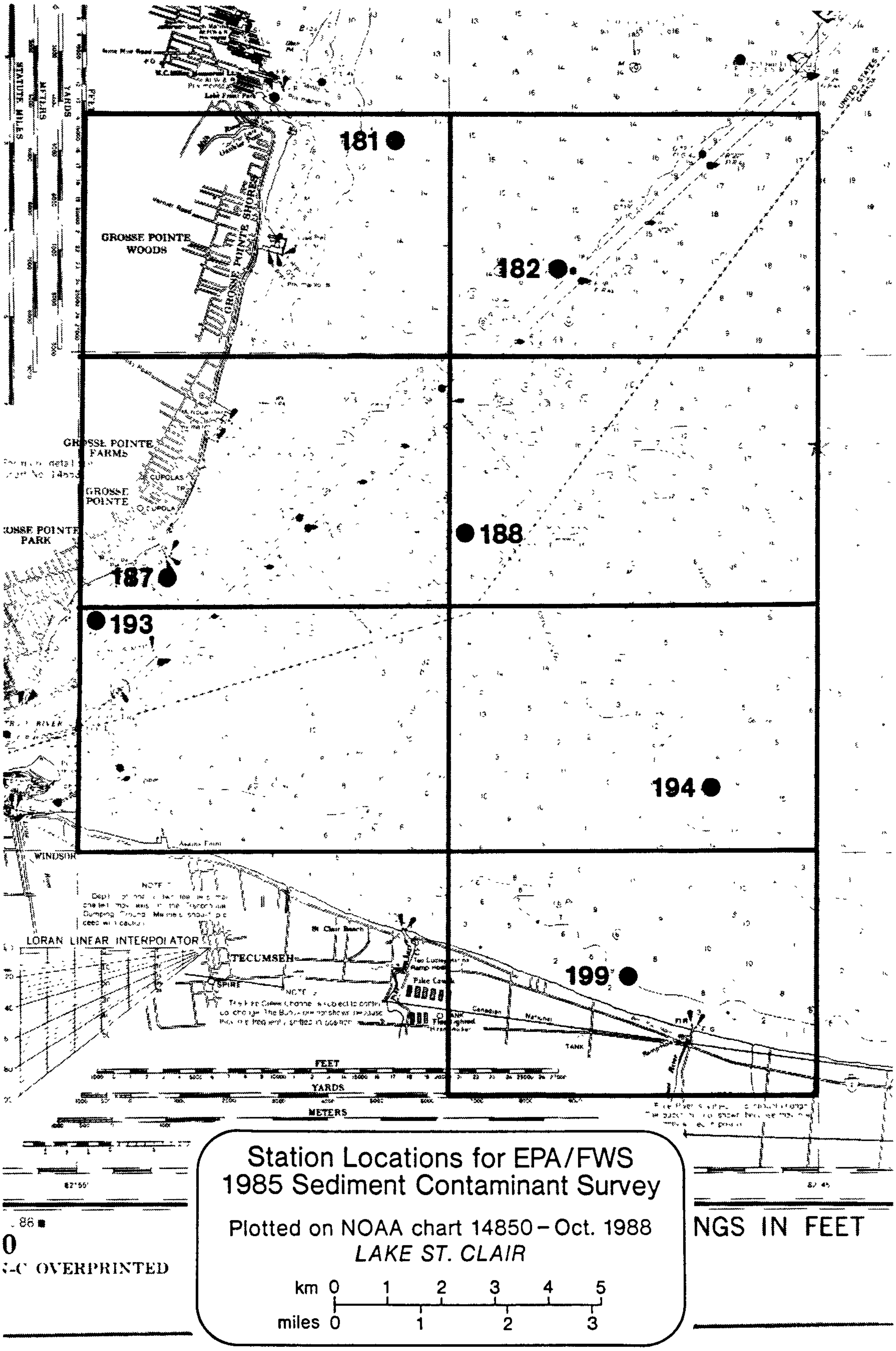
MARINE CITY
PORT LAMBTON
ALGONAC
CHENAL
Station Locations for EPA/FWS
1985 Sediment Contaminant Survey
Plotted on NOAA chart 14852 - Dec. 1988
ST. CLAIR RIVER
km 0 1 2 3
miles 0 0.5 1.0 1.5 2.0
NOTES
CAUTION


Pearl Beach
Pte aux Tremble
Locust Point
154
155
156
157
158
ISLAND
HARSEN
WALPOLE
ISLAND
SQUIRREL
BASSETT
ISLAND
CHANNEL
Station Locations for EPA/FWS
1985 Sediment Contaminant Survey
Plotted on NOAA chart 14852 – Dec. 1988
ST. CLAIR RIVER
km 0 1 2 3
miles 0 0.5 1.0 1.5 2.0


Station Locations for EPA/FWS
1985 Sediment Contaminant Survey
Plotted on NOAA chart 14850 – Oct. 1988
LAKE ST. CLAIR
km 0 1 2 3 4 5
miles 0 1 2 3
Anchorville
Fair Haven
161
162
163
164
165
159
160
BOUVIER BAY
DICKINSON
ISLAND
HARSENS
ISLAND
GOOSE BAY
ST CLAIR HAVEN
CAUTION


Station Locations for EPA/FWS
1985 Sediment Contaminant Survey
Plotted on NOAA chart 14850 – Oct. 1988
LAKE ST. CLAIR
km 0 1 2 3 4 5
miles 0 1 2 3
166
168
169
137
172
171
173
174
175
176
177
DICKINSON
ISLAND
HARSEN
ISLAND
SEAWAY
ISLAND
BASSETT
ISLAND
ST CLAIR HAVEN
ST CLAIR SHORES
GOOSE BAY
BIG MUSCAMOOT BAY
Little Muscamoot Bay
Fisher Bay
SOUTHEAST BEND
LORAN-C
RACING BUOYS
L A K E
S
M
YARDS

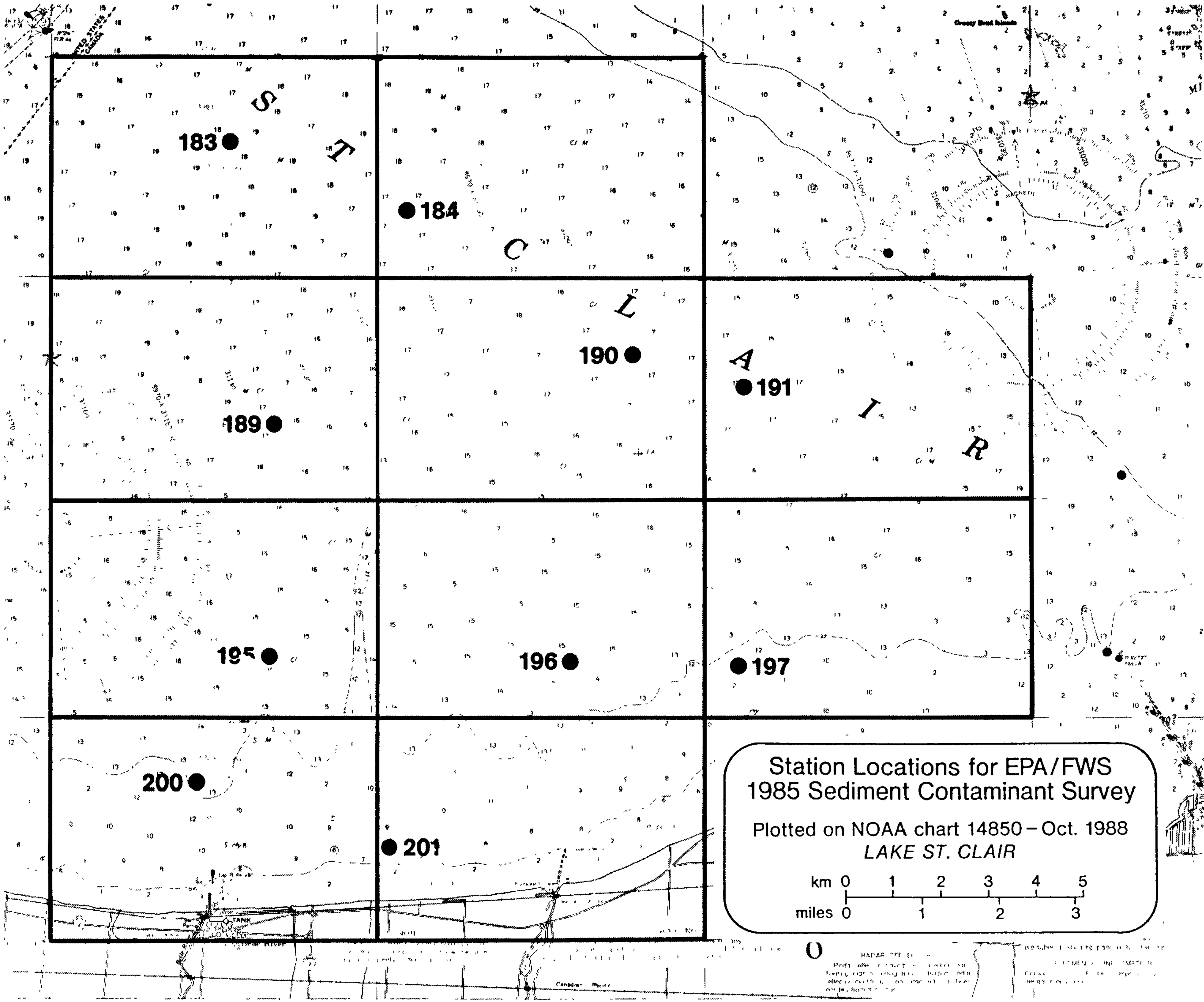

Station Locations for EPA/FWS
1985 Sediment Contaminant Survey
Plotted on NOAA chart 14850 – Oct. 1988
LAKE ST. CLAIR
km 0 1 2 3 4 5
miles 0 1 2 3
DICKINSON
ISLAND
HARSENS
ISLAND
SQUIRREL
ISLAND
WALPOLE
ANNE
ISLAND
BASSETT
ISLAND
SEAWAY
ISLAND
BIG MUSCAMOOT BAY
SOUTHEAST BEND
Little Muscamoot Bay
GOOSE BAY
WALLACEBUR
ALGONAC
JOHNSTON
JOHNSTON BAY
CHENAL
CHANNEL
Fisher Bay
Grassy Bend Islands
170
178
179
180



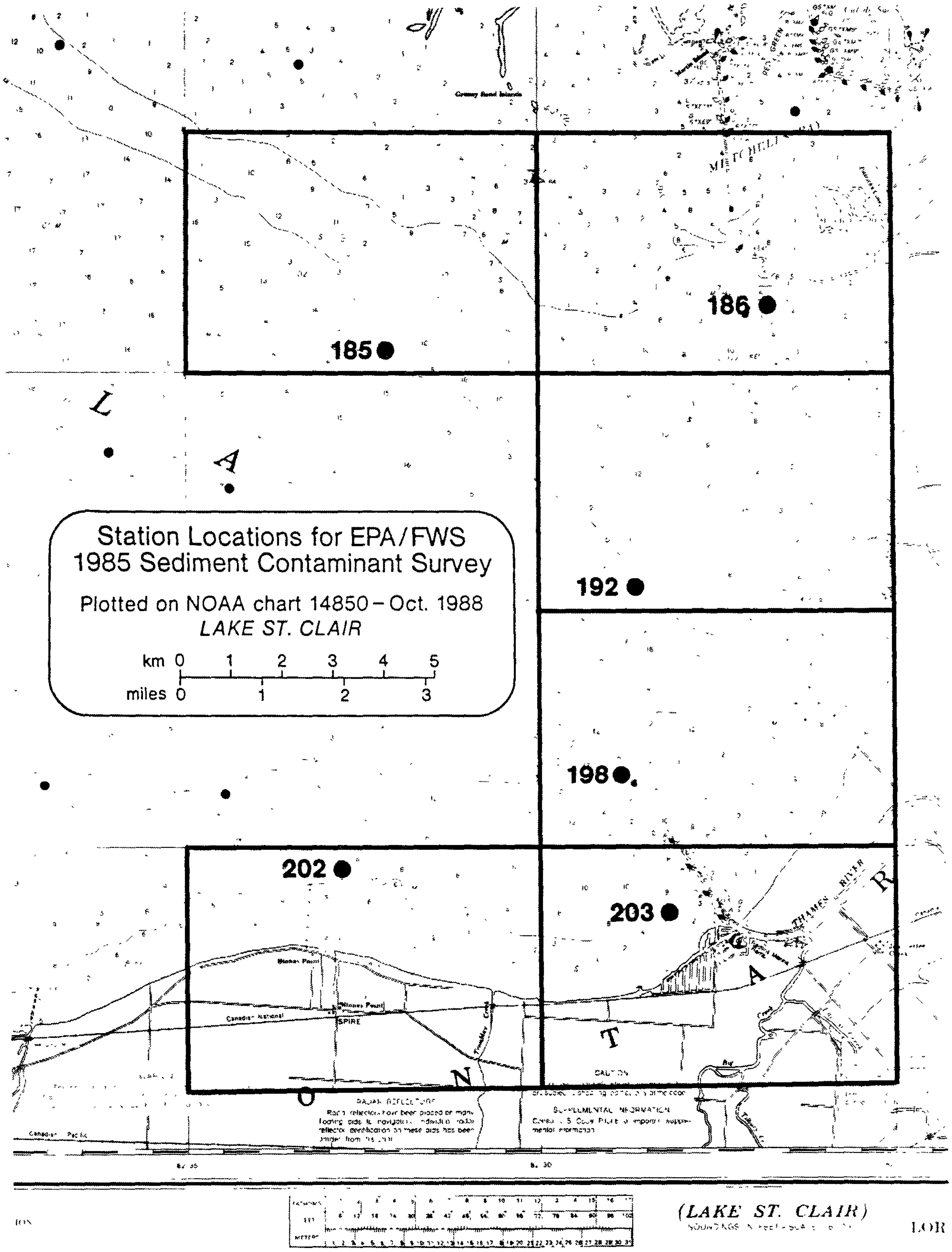
Station Locations for EPA/FWS
1985 Sediment Contaminant Survey

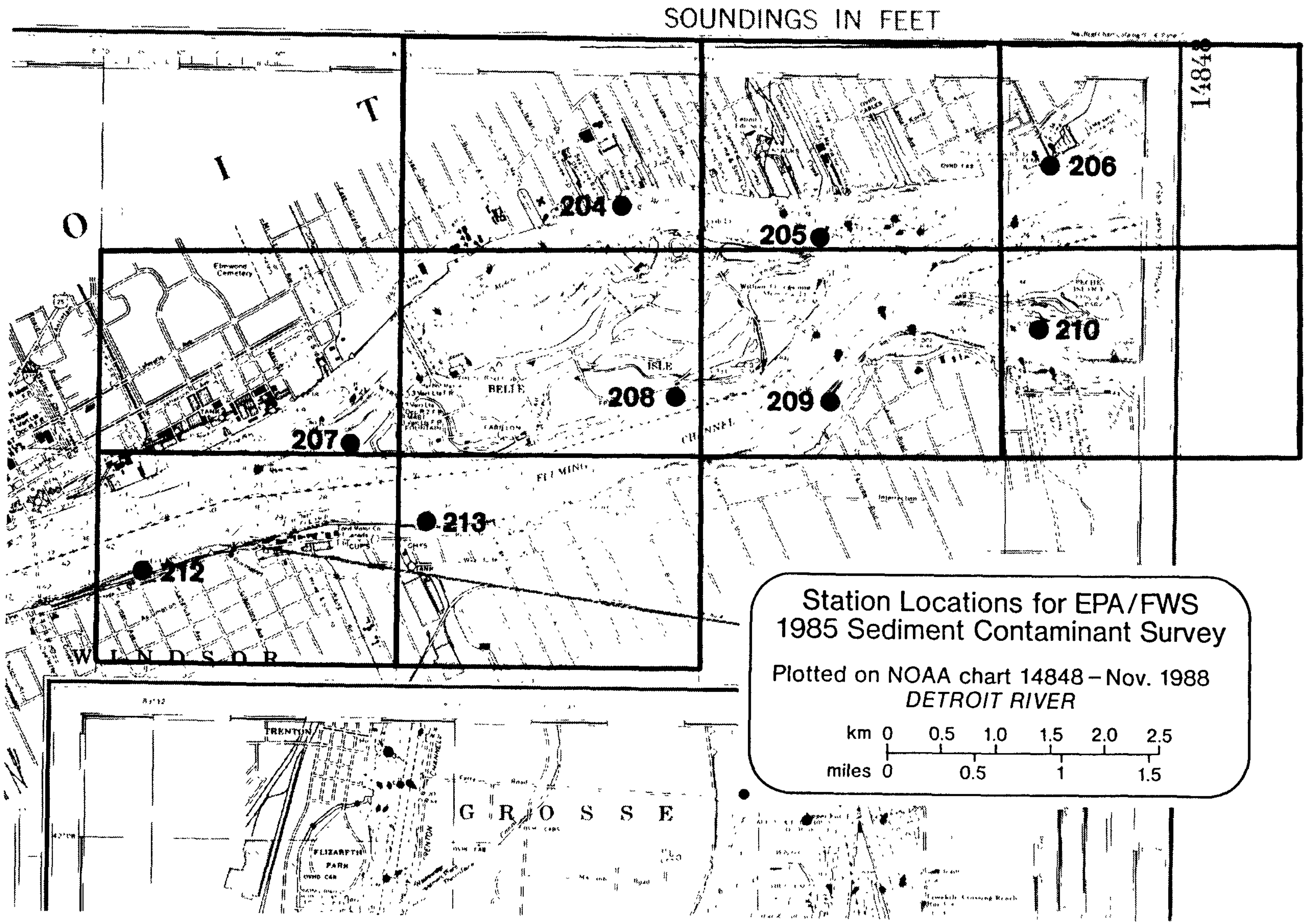
Plotted on NOAA chart 14850 – Oct. 1988
LAKE ST. CLAIR

km 0 1 2 3 4 5
miles 0 1 2 3



S T
C L
A I R
183
184
189
190
191
196
197
200
201
Station Locations for EPA/FWS
1985 Sediment Contaminant Survey
Plotted on NOAA chart 14850 – Oct. 1988
LAKE ST. CLAIR
km 0 1 2 3 4 5
miles 0 1 2 3

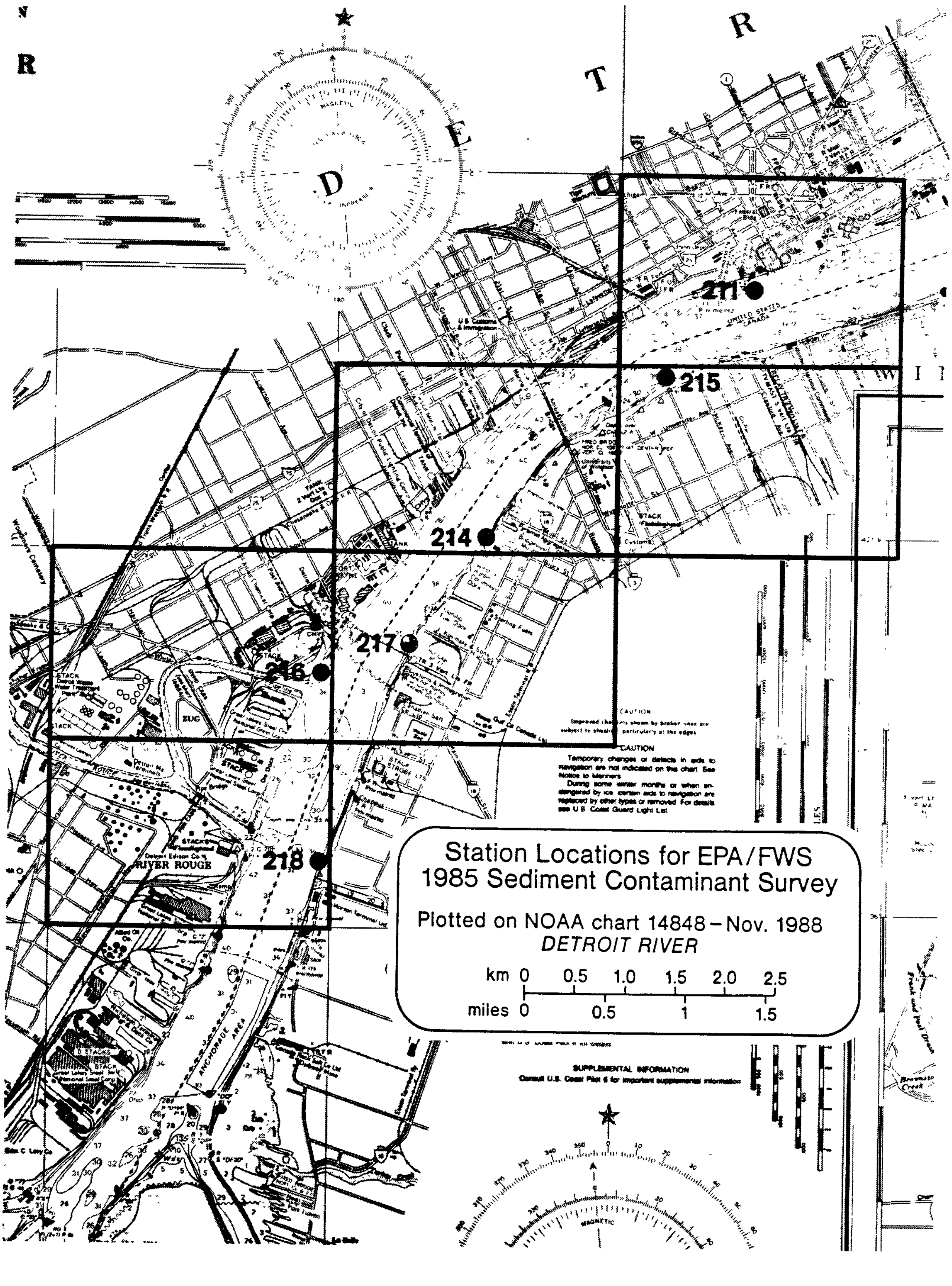

Station Locations for EPA/FWS
1985 Sediment Contaminant Survey
Plotted on NOAA chart 14850 – Oct. 1988
LAKE ST. CLAIR
km 0 1 2 3 4 5
miles 0 1 2 3
185
186
192
198
202
203
THAMES RIVER
(LAKE ST. CLAIR)

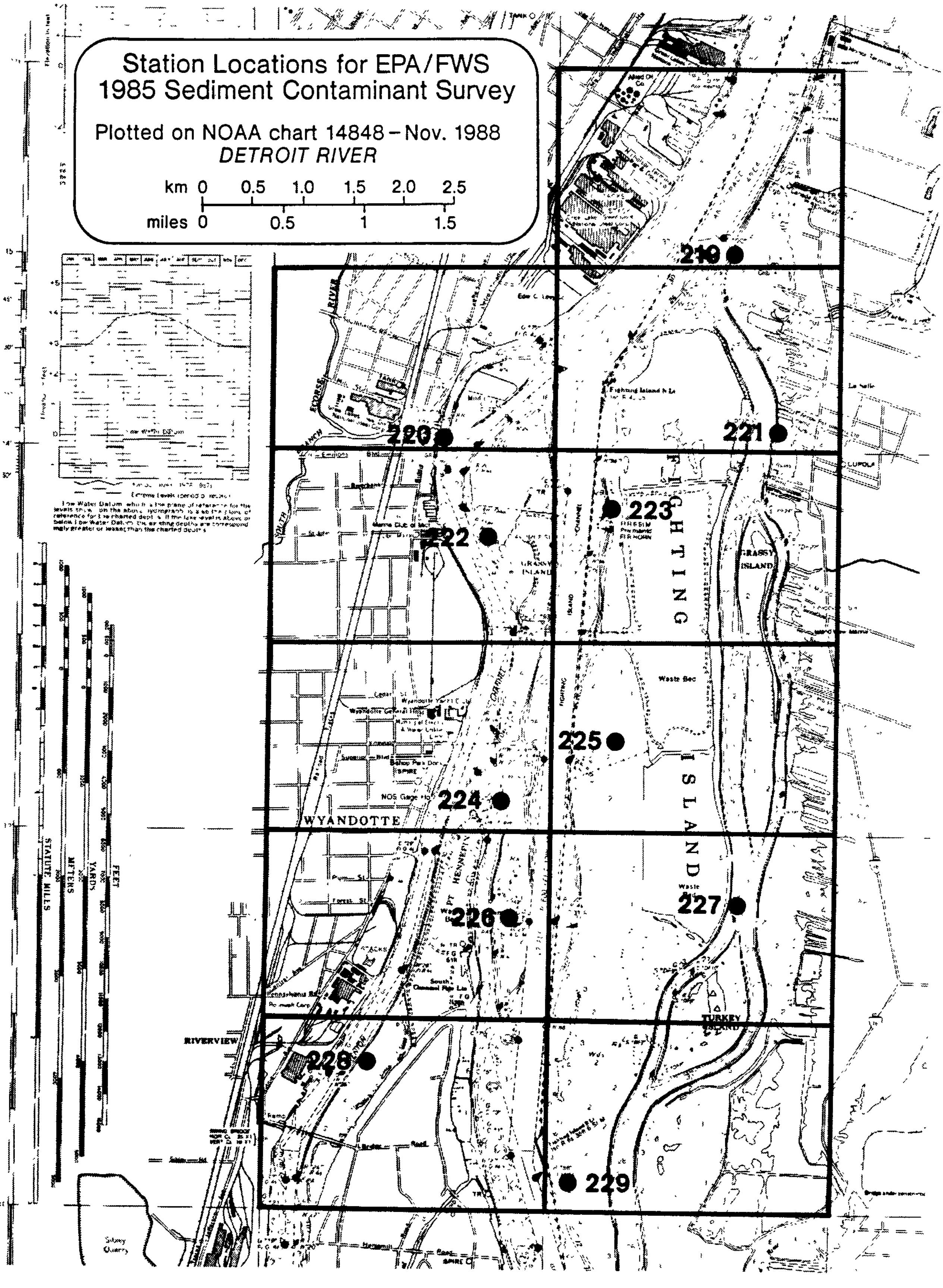


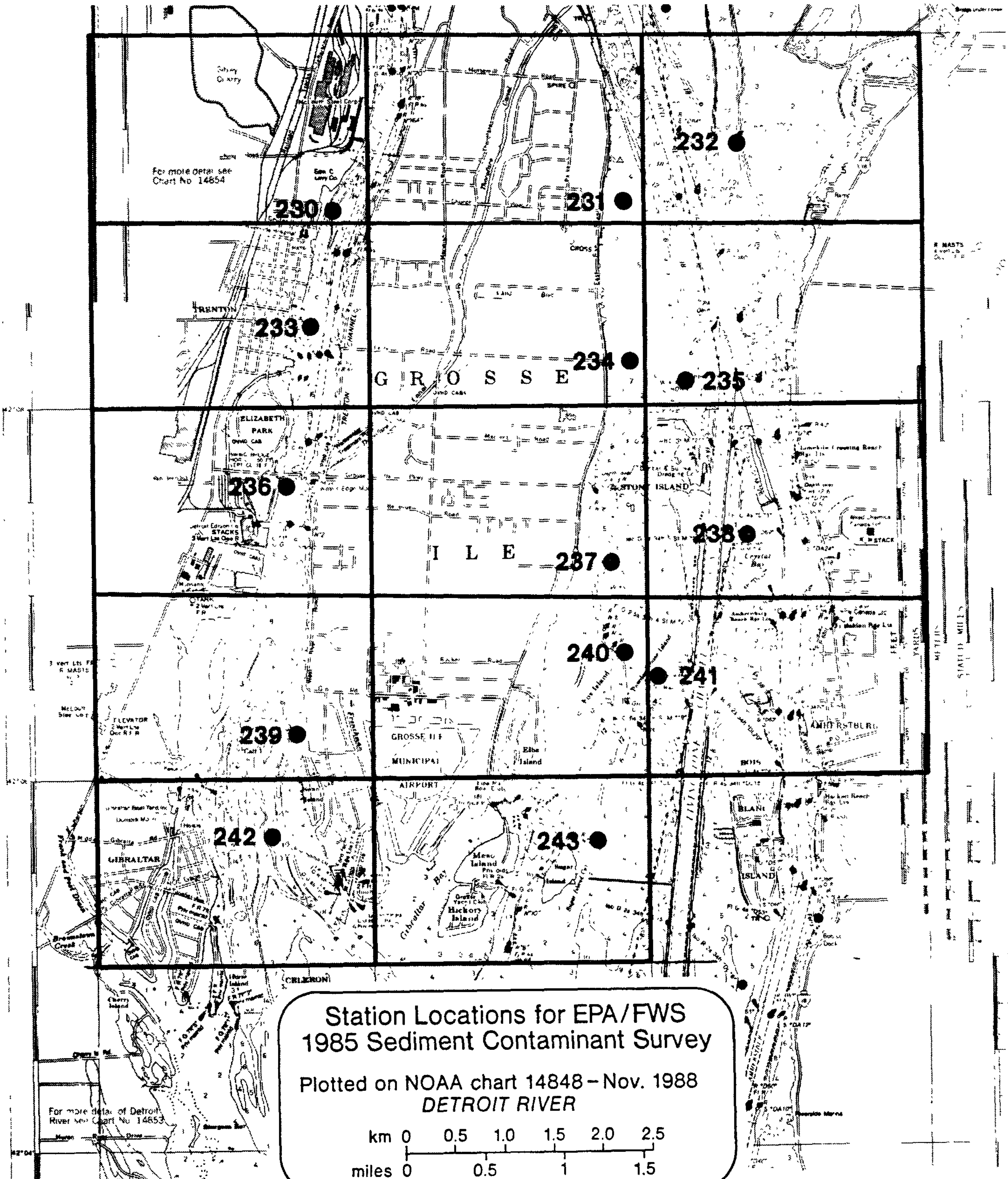
Station Locations for EPA/FWS
1985 Sediment Contaminant Survey

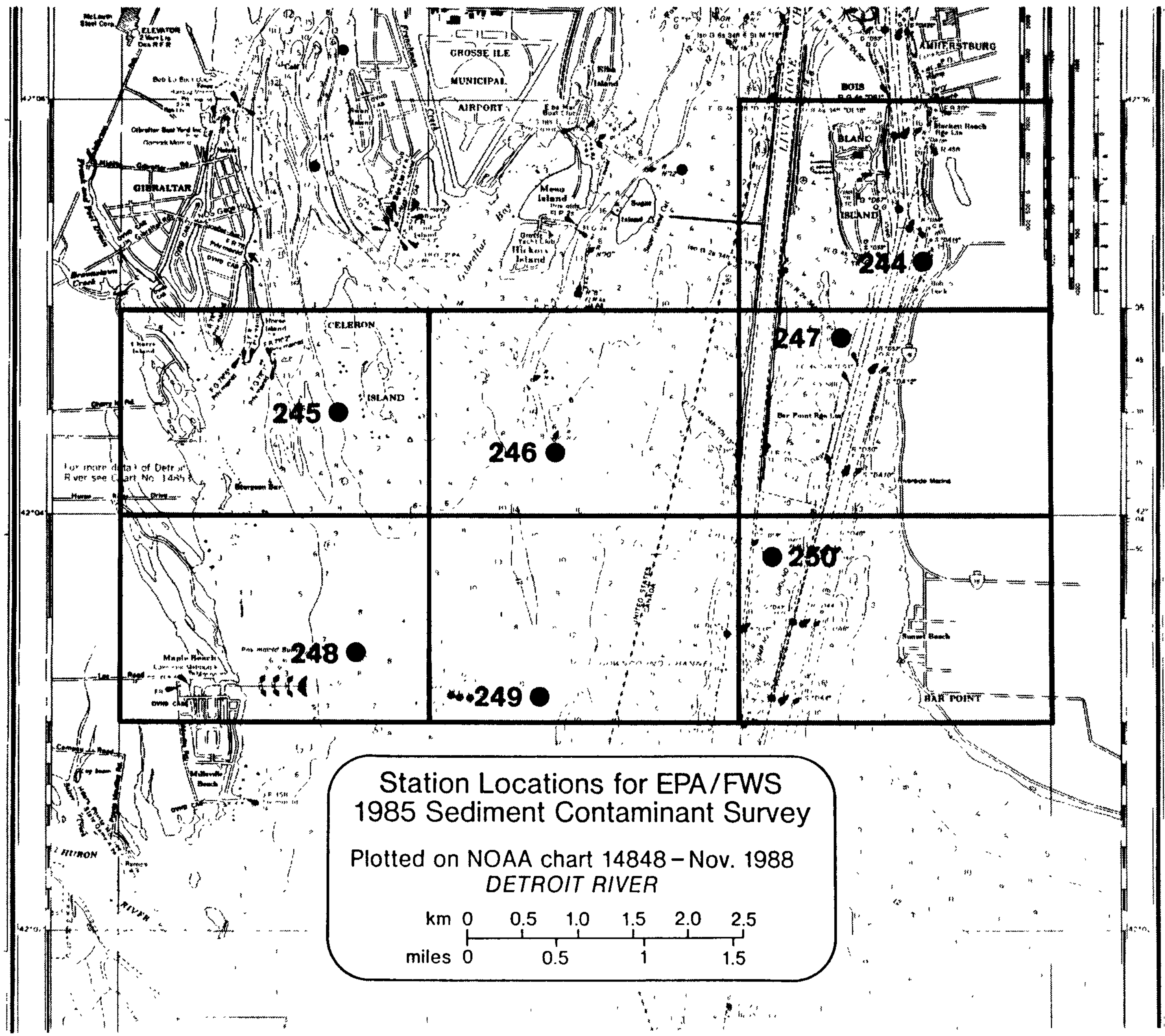
Plotted on NOAA chart 14848 – Nov. 1988
DETROIT RIVER

km 0 0.5 1.0 1.5 2.0 2.5
miles 0 0.5 1 1.5


211
215
214
217
216
218
RIVER ROUGE
Station Locations for EPA/FWS
1985 Sediment Contaminant Survey
Plotted on NOAA chart 14848 – Nov. 1988
DETROIT RIVER
km 0 0.5 1.0 1.5 2.0 2.5
miles 0 0.5 1 1.5


Station Locations for EPA/FWS
1985 Sediment Contaminant Survey
Plotted on NOAA chart 14848 – Nov. 1988
DETROIT RIVER
km 0 0.5 1.0 1.5 2.0 2.5
miles 0 0.5 1 1.5
219
220
221
222
223
224
225
226
227
228
229
WYANDOTTE
RIVERVIEW
GRASSY ISLAND
TURKEY ISLAND
STATUTE MILES
METERS
YARDS
FEET


230
231
232
233
234
235
236
237
238
239
240
241
242
243
GROSSE
ILE
TRENTON
GIBRALTAR
AMHERSTBURG
For more detail see Chart No 14854
Station Locations for EPA/FWS
1985 Sediment Contaminant Survey
Plotted on NOAA chart 14848 – Nov. 1988
DETROIT RIVER
km 0 0.5 1.0 1.5 2.0 2.5
miles 0 0.5 1 1.5



Station Locations for EPA/FWS
1985 Sediment Contaminant Survey
Plotted on NOAA chart 14848 – Nov. 1988
DETROIT RIVER
km 0 0.5 1.0 1.5 2.0 2.5
miles 0 0.5 1 1.5
244
245
246
247
248
249
250
GROSSE ILE MUNICIPAL AIRPORT
GIBRALTAR
CELERON ISLAND
BOIS BLANC ISLAND
AMHERSTBURG
BAR POINT

Appendix 2. *Methodology and quality control information used in the chemical analyses of sediments at 250 stations in the upper Great Lakes connecting channels, June 1985.*[1/]

Parameters	Unit	Approximate limit of detection[2/]	Recovery of internal standards (range in %)	Comment
ICAP Metals	mg/kg dry weight basis	0.2	77 - 108	"Preparation of Sediments and Other Solids for ICAP Analysis" Central Regional Laboratory, (CRL) Method #MET 413. "Standard Operative Procedure (SOP) for the Determination of Total Metals in Water by ICAP CRL Method #MET 111" Reference USEPA 1979a.
Cd		0.6		
Co		0.6		
Cu		0.8		
Cr		7.0		
Pb		2.0		
Ni		4.0		
Zn				
Cn	mg/kg dry weight basis	0.1	73 - 102	"SOP for Total Cyanide, CRL Method #MIN 71919" Reference USEPA 1979b.
Phenol	mg/kg dry weight basis	0.1	95 - 114	"SOP: Phenols, Total Recoverable, CRL Method #MIN 74818" Reference USEPA 1979b.
Mercury	mg/kg dry weight basis	0.1	87 - 114	"SOP: Total Mercury in Fish and Sediments, CRL Method #MIN 7336" Reference USEPA 1979b.
Volatile Solids	% of total solids	0.01	N/A	"SOP for Total Volatile Solids (%) in Sediments and Solids, CRL Method #447" Gravimetric determination at 550°C + 50°C.
% Solids	% dry weight (g) / wet weight (g)	0.1	N/A	"SOP for Total Residue (% Solids), CRL Method #444" Gravimetric determination.
Oil and Grease	mg/kg dry weight basis	650	N/A	"SOP: Analysis of Sediments and Other Solids for Oil and Grease, CRL Method #PES2415243." Reference APHA-AWWA-WPCF 1980, Method 503D.
PCBs	mg/kg dry weight basis	0.03	74 - 106	"SOP: Analysis of Polychlorinated Biphenyls in Soils and Sediment Bottoms, CRL Method #PES1262-84 Revised 05/86".

[1/] Source: John Morris, Chief, Inorganic Chemistry Section, USEPA, Region V. Chicago, Illinois.

[2/] Limit of detection is sample specific and may vary slightly from this value.

Appendix 3. *Concentrations of heavy metals (mg/kg) in sediments at 250 stations in the upper Great Lakes connecting channels in June 1985. The letter designation following the station number indicates whether the station was located in U.S. (A) or Canadian (C) waters. Values with an asterisk (*) exceed U.S. guidelines for moderately polluted sediments (Cr, Cu, Ni, Pb, Zn) or Canadian guidelines for polluted sediments (Hg, Cd). Analytical results below the guideline of detection for a particular method are followed by a "t" code in conformance with established procedures for reporting low level data.*

Station number	Jurisdiction	Hg	Cd	Co	Cr	Cu	Ni	Pb	Zn
St. Marys River									
1	C	0.04	0.40	4.8	17.0	16.0	9.2	19.0	64
2	C	0.13	1.80*	8.4	58.0*	110.0*	30.0*	130.0*	470*
3	C	0.03	0.20	3.1	10.0	7.9	6.1	8.8	29
4	A	0.13	1.50*	8.0	58.0*	70.0*	27.0*	84.0*	260*
5	C	0.01 t	0.20	2.8	7.4	6.5	4.3	7.0	36
6	C	0.03	0.20	7.0	18.0	19.0	13.0	7.6	46
7	C	0.02 t	0.20	2.8	8.8	6.9	4.7	7.6	30
8	C	0.05	1.10*	6.6	47.0*	35.0*	16.0	66.0*	330*
9	C	0.00 t	0.31	5.7	26.0*	26.0*	13.0	52.0*	260*
10	C	0.02 t	0.42	2.7	10.0	13.0	5.9	29.0	60
11	C	0.05	0.60	6.3	78.0*	49.0*	22.0*	62.0*	190*
12	C	0.10	0.90	6.3	59.0*	44.0*	24.0*	75.0*	220*
13	A	0.16	0.90	7.7	53.0*	49.0*	23.0*	74.0*	210*
14	C	0.02 t	0.20	3.6	9.3	8.0	6.6	10.0	29
15	C	0.10	0.20	5.8	15.0	12.0	11.0	16.0	62
16	C	0.03	0.30	2.2	6.0	6.0	4.0	11.0	16
17	A	0.03	0.80	4.6	26.0*	18.0	8.5	18.0	37
18	A	0.05	0.40	4.3	18.0	20.0	8.6	18.0	36
19	A	0.02	1.00*	2.3	41.0*	17.0	7.6	29.0	26
20	C	0.11	0.40	7.0	45.0*	31.0*	17.0	72.0*	220*
21	A	0.00 t	0.60	5.6	40.0*	44.0*	17.0	53.0*	150*
22	A	0.11	0.20	10.0	40.0*	32.0*	21.0*	51.0*	150*
23	A	0.07	0.30	13.0	56.0*	53.0*	31.0*	76.0*	240*
24	C	0.04	0.20	2.4	7.6	5.6	4.6	7.0	28
25	C	0.00 t	0.20	1.2	2.7	1.8	1.8	7.0	6
26	C	0.00 t	0.90	3.8	14.0	34.0*	9.6	30.0	57
27	A	0.00 t	0.90	8.5	20.0	6.1	6.6	21.0	22
28	A	0.03	0.20	1.9	6.6	5.3	4.3	7.0	24
29	C	0.03 t	0.60	11.0	47.0*	53.0*	27.0*	76.0*	240*
30	C	0.09	0.30	6.2	26.0*	26.0*	14.0	47.0*	140*
31	A	0.06	0.50	1.7	5.0	5.1	3.5	7.0	14
32	A	0.00 t	0.70	3.9	13.0	12.0	8.0	7.0	26
33	A	0.01 t	0.30	3.4	20.0	15.0	8.7	15.0	49
34	A	0.10	0.50	9.2	43.0*	41.0*	25.0*	43.0*	140*
35	A	0.01 t	0.20	9.5	37.0*	22.0	23.0*	9.0	45
36	A	0.00 t	0.40	8.1	33.0*	30.0*	19.0	42.0*	130*
37	C	0.05	0.20	3.1	10.0	6.2	5.7	7.0	18
38	C	0.01 t	0.20	1.6	3.7	3.6	3.2	7.0	21
39	A	0.25	0.20	1.7	6.2	4.0	3.2	7.0	11
40	A	0.27	0.20	3.0	21.0	11.0	7.4	12.0	33

Appendix 3. *(Continued)*

Station number	Jurisdiction	Hg	Cd	Co	Cr	Cu	Ni	Pb	Zn
41	A	0.01 t	0.20	4.0	12.0	9.8	7.0	13.0	55
42	A	0.01 t	0.20	3.0	8.3	7.3	6.0	7.0	20
43	C	0.00 t	0.20	3.7	11.0	9.8	7.3	15.0	55
44	C	0.00 t	0.20	2.6	6.6	4.4	5.0	7.0	16
45	A	0.02	0.20	6.3	29.0*	14.0	13.0	13.0	27
46	A	0.01	0.20	1.5	4.8	3.7	3.6	7.0	19
47	A	0.01	0.30	0.9	2.7	4.0	2.2	7.0	14
48	C	0.02	0.20	5.0	17.0	11.0	12.0	9.6	37
49	A	0.05	1.20*	11.0	45.0*	15.0	13.0	35.0	35
50	A	0.01 t	0.20	3.1	9.9	7.4	6.9	7.0	21
51	A	0.04 t	0.20	6.5	22.0	21.0	16.0	17.0	75
52	C	0.02	0.20	2.7	8.1	8.4	5.7	12.0	46
53	A	0.00 t	0.20	2.8	13.0	8.3	5.8	8.1	22
54	A	0.01 t	0.20	1.4	9.5	4.2	3.0	7.0	13
55	A	0.02 t	0.20	2.6	11.0	8.2	5.8	11.0	28
56	C	0.12	0.40	12.0	42.0*	41.0*	28.0*	39.0	180*
57	A	0.02 t	0.20	2.1	11.0	5.9	4.5	7.0	19
58	A	0.03	0.20	2.2	12.0	8.0	5.4	10.0	26
59	A	0.03	0.20	2.2	7.3	6.3	4.6	9.7	33
60	C	0.11	0.70	9.5	36.0*	34.0*	22.0*	43.0*	200*
61	A	0.02	0.20	2.4	20.0	7.6	5.7	7.8	23
62	A	0.01 t	0.20	1.0	4.5	2.6	1.8	7.0	11
63	A	0.02 t	0.20	3.8	15.0	12.0	8.3	10.0	40
64	A	0.04	0.20	6.2	36.0*	22.0	14.0	17.0	60
65	C	0.05	0.30	5.2	31.0*	18.0	12.0	15.0	61
66	C	0.04	0.20	4.5	18.0	12.0	9.6	12.0	50
67	A	0.01 t	0.20	8.1	33.0*	16.0	17.0	9.1	41
68	A	0.02	0.20	3.7	23.0	12.0	8.0	11.0	32
69	C	0.01 t	0.20	6.9	25.0*	19.0	16.0	19.0	72
70	C	0.06	0.20	7.5	28.0*	24.0	16.0	28.0	110*
71	C	0.07	0.20	11.0	46.0*	35.0*	25.0*	35.0	150*
72	A	0.01 t	0.20	2.2	10.0	4.6	3.5	7.0	16
73	A	0.00 t	0.20	4.0	29.0*	11.0	7.2	7.7	30
74	A	0.31 *	0.40	4.5	40.0*	15.0	10.0	15.0	37
75	C	0.01 t	0.40	2.8	16.0	10.0	5.4	9.2	30
76	A	0.01 t	0.20	14.0	45.0*	28.0*	31.0*	7.0	53
77	A	0.01 t	0.20	3.6	16.0	7.9	5.9	7.0	20
78	A	0.02 t	0.20	7.6	40.0*	23.0	15.0	18.0	57
79	C	0.02 t	0.20	6.9	34.0*	22.0	15.0	20.0	61
80	A	0.00 t	0.20	8.5	38.0*	20.0	17.0	16.0	46
81	A	0.00 t	0.20	4.6	26.0*	13.0	8.7	10.0	31
82	A	0.00 t	0.20	6.2	23.0	15.0	12.0	8.7	27
83	A	0.09	0.20	7.5	42.0*	24.0	16.0	18.0	59
84	C	0.06	0.20	14.0	54.0*	30.0*	33.0*	13.0	59
85	A	0.09	0.20	11.0	35.0*	18.0	22.0*	9.1	44

Appendix 3. *(Continued)*

Station number	Jurisdiction	Hg	Cd	Co	Cr	Cu	Ni	Pb	Zn
86	A	0.11	0.20	7.8	24.0	14.0	15.0	8.4	29
87	A	0.10	0.20	9.8	35.0*	16.0	20.0*	9.0	40
88	A	0.13	0.20	4.3	22.0	10.0	8.0	7.4	23
89	A	0.14	0.20	8.0	50.0*	21.0	17.0	16.0	50
90	A	0.08	0.20	15.0	63.0*	31.0*	34.0*	20.0	63
91	A	0.13	0.20	10.0	34.0*	17.0	20.0*	14.0	43
92	A	0.06	0.20	5.8	19.0	11.0	12.0	7.0	22
93	A	0.16	0.20	20.0	64.0*	35.0*	44.0*	19.0	74
94	A	0.05	0.20	20.0	70.0*	41.0*	44.0*	20.0	74
95	A	0.04	0.20	7.6	28.0*	18.0	15.0	10.0	31
96	A	0.06	0.20	9.2	49.0*	26.0*	21.0*	28.0	64
97	A	0.10	0.20	8.6	46.0*	22.0	18.0	17.0	51
98	A	0.08	0.20	7.9	39.0*	26.0*	18.0	22.0	57
99	A	0.06	0.20	11.0	35.0*	25.0*	22.0*	15.0	45
100	A	0.04	0.20	10.0	51.0*	25.0*	20.0*	21.0	57
101	A	0.06	0.20	11.0	48.0*	29.0*	24.0*	23.0	62
102	A	0.04 t	0.20	12.0	55.0*	28.0*	25.0*	19.0	73
103	A	0.09	0.20	11.0	58.0*	28.0*	24.0*	19.0	70
104	C	0.03	0.20	2.8	9.1	6.3	5.6	7.0	16
105	A	0.00 t	0.20	6.1	20.0	14.0	14.0	7.0	26
106	A	0.02	0.20	7.2	27.0*	17.0	16.0	10.0	39
107	C	0.10	0.20	8.8	41.0*	22.0	20.0*	19.0	57
108	A	0.01 t	0.20	6.5	21.0	10.0	14.0	7.0	29
109	A	0.02 t	0.20	13.0	56.0*	30.0*	29.0*	25.0	82
110	A	0.02 t	0.20	9.6	45.0*	21.0	22.0*	13.0	54
111	A	0.03	0.20	14.0	60.0*	42.0*	26.0*	37.0	86
112	C	0.03	0.30	8.1	34.0*	24.0	20.0*	20.0	54
113	A	0.03	0.20	1.1	4.2	2.3	3.4	7.0	6
114	A	0.11	0.20	12.0	54.0*	30.0*	27.0*	20.0	80
115	A	0.04	0.20	11.0	51.0*	27.0*	26.0*	22.0	79
116	A	0.09	0.30	12.0	60.0*	33.0*	29.0*	26.0	89
117	A	0.07	0.20	13.0	68.0*	31.0*	29.0*	24.0	86
118	A	0.08	0.20	10.0	47.0*	24.0	23.0*	23.0	66
119	A	0.12	0.20	14.0	63.0*	34.0*	36.0*	29.0	98*
120	A	0.10	0.20	15.0	64.0*	35.0*	38.0*	35.0	110*
121	A	0.04	0.20	6.1	29.0*	14.0	14.0	10.0	40
122	A	0.09	0.20	15.0	67.0*	33.0*	33.0*	27.0	97*
123	A	0.10	0.20	11.0	48.0*	28.0*	27.0*	28.0	79
124	A	0.09	0.20	15.0	63.0*	35.0*	37.0*	38.0	110*
125	A	0.02	0.20	3.0	11.0	6.9	6.8	9.8	21
St. Clair River									
126	A	0.01 t	0.30	3.2	7.4	55.0*	18.0	30.0	42
127	C	0.02 t	0.30	5.3	12.0	25.0*	16.0	24.0	54
128	C	0.01 t	0.40	5.1	11.0	38.0*	14.0	31.0	64
129	A	0.01 t	0.20	7.2	14.0	45.0*	17.0	28.0	83
130	C	0.06	0.50	6.0	15.0	41.0*	20.0*	53.0*	79

Appendix 3. *(Continued)*

Station number	Jurisdiction	Hg	Cd	Co	Cr	Cu	Ni	Pb	Zn
131	A	0.01 t	0.60	3.8	8.2	45.0*	10.0	28.0	81
132	A	0.01 t	0.40	6.8	15.0	43.0*	18.0	38.0	91*
133	A	0.01 t	0.70	4.8	8.6	38.0*	13.0	50.0*	90*
134	A	0.03 t	0.70	4.4	9.2	42.0*	12.0	27.0	79
135	A	0.00 t	0.60	8.1	13.0	31.0*	20.0*	31.0	91*
136	C	0.01 t	0.50	4.9	11.0	27.0*	14.0	27.0	64
137	A	0.01 t	0.60	6.2	13.0	40.0*	17.0	33.0	94*
138	C	0.00 t	0.60	4.4	9.3	23.0	12.0	25.0	57
139	A	0.00 t	1.00*	3.4	6.7	21.0	8.2	24.0	48
140	C	0.18	0.40	8.5	15.0	31.0*	24.0*	63.0*	67
141	C	0.49*	0.60	7.0	13.0	34.0*	19.0	92.0*	87
142	C	0.42*	0.50	5.5	12.0	29.0*	14.0	85.0*	77
143	A	0.00 t	0.30	7.6	12.0	19.0	21.0*	17.0	59
144	C	0.12	0.20	7.1	15.0	15.0	17.0	32.0	51
145	A	0.04	0.40	3.5	7.4	12.0	8.4	7.6	46
146	C	0.06	0.20	5.1	9.1	11.0	11.0	9.4	310*
147	A	0.05	0.30	2.7	5.2	10.0	6.2	7.0	37
148	C	0.47*	0.40	4.4	8.0	9.9	9.4	19.0	34
149	A	0.06	0.20	8.4	15.0	20.0	20.0*	26.0	74
150	C	0.42*	0.30	4.4	10.0	16.0	12.0	22.0	50
151	C	0.52*	0.30	2.8	6.5	7.1	5.9	21.0	29
152	C	0.60*	0.20	3.1	6.6	10.0	6.3	20.0	41
153	C	0.55*	0.40	3.0	6.8	8.2	7.0	18.0	36
154	A	0.02 t	0.20	3.3	7.0	8.0	7.0	7.2	28
155	A	0.03 t	0.30	4.8	11.0	20.0	13.0	17.0	58
156	C	0.39*	1.20*	3.1	6.0	9.4	6.4	14.0	33
157	A	0.18	0.40	4.8	10.0	18.0	12.0	18.0	56
158	A	0.17	0.30	4.0	8.6	13.0	9.9	15.0	49
159	A	0.04 t	0.60	6.5	13.0	25.0*	18.0	19.0	73
160	A	0.02 t	0.20	4.8	8.2	17.0	12.0	10.0	47
Lake St. Clair									
161	A	0.02 t	0.20	5.2	6.6	6.2	8.6	8.1	31
162	A	0.03 t	0.20	5.4	9.8	14.0	12.0	14.0	48
163	A	0.08	0.30	4.4	7.8	14.0	9.3	10.0	58
164	A	0.02 t	0.20	4.3	7.5	13.0	9.6	11.0	56
165	A	0.00 t	0.20	3.9	6.2	5.5	7.4	7.0	20
166	A	0.08	0.20	6.5	12.0	19.0	15.0	15.0	62
167	A	0.04 t	1.00*	7.1	25.0*	27.0*	33.0*	50.0*	130*
168	A	0.01 t	0.30	4.5	11.0	8.0	14.0	19.0	46
169	A	0.02 t	0.20	7.8	10.0	9.2	15.0	7.0	40
170	A	0.02 t	0.20	4.0	7.7	6.8	8.0	7.0	35
171	A	0.01 t	0.20	4.7	8.2	5.5	10.0	7.0	38
172	A	0.01 t	0.20	4.3	8.0	7.0	9.0	11.0	35
173	A	0.45*	0.20	4.7	8.0	13.0	13.0	14.0	45
174	C	0.20	0.20	2.1	4.2	3.0	4.0	7.0	19
175	A	0.07	1.40*	4.0	14.0	25.0*	11.0	39.0	67

Appendix 3. *(Continued)*

Station number	Jurisdiction	Hg	Cd	Co	Cr	Cu	Ni	Pb	Zn
176	A	0.30*	0.80	6.4	16.0	20.0	17.0	28.0	62
177	C	2.71*	0.40	6.6	17.0	30.0*	19.0	29.0	73
178	C	0.05	0.20	2.2	5.3	2.3	4.7	7.0	23
179	C	0.04	0.20	1.7	4.3	2.1	3.8	7.0	18
180	C	0.15	0.20	3.5	13.0	9.2	11.0	10.0	29
181	A	0.06	0.30	5.3	13.0	11.0	16.0	24.0	53
182	A	0.25	0.30	7.3	17.0	24.0	22.0*	29.0	70
183	C	2.02*	0.20	6.7	17.0	23.0	20.0*	31.0	67
184	C	0.36*	0.20	5.4	13.0	9.8	13.0	21.0	45
185	C	0.03	0.20	4.0	5.9	2.1	7.0	7.0	30
186	C	0.03 t	0.20	3.5	8.0	6.3	8.0	7.0	23
187	A	0.18	0.30	4.4	13.0	13.0	15.0	26.0	61
188	A	0.06	0.20	7.0	14.0	15.0	17.0	14.0	55
189	C	0.62*	0.20	8.4	23.0	23.0	25.0*	31.0	76
190	C	0.82*	0.20	9.5	26.0*	29.0*	30.0*	34.0	91*
191	C	0.47*	0.20	6.8	19.0	22.0	22.0*	30.0	67
192	C	0.00 t	0.20	3.8	8.5	5.4	7.5	11.0	37
193	A	0.39*	0.20	3.8	9.0	5.5	10.0	7.0	34
194	C	0.61*	0.20	7.9	21.0	23.0	24.0*	37.0	72
195	C	0.32*	0.20	7.4	24.0	19.0	23.0*	28.0	63
196	C	0.13	0.20	7.2	18.0	17.0	22.0*	24.0	60
197	C	0.17	0.20	5.1	12.0	9.1	14.0	12.0	39
198	C	0.02 t	0.20	5.5	13.0	12.0	16.0	15.0	49
199	C	0.10	0.20	1.6	3.3	2.3	4.4	7.0	11
200	C	0.09	0.20	3.3	7.4	4.6	7.3	9.0	39
201	C	0.04	0.20	1.9	2.8	1.4	4.9	7.0	16
202	C	0.06	0.20	4.1	9.6	7.1	11.0	8.5	34
203	C	0.03 t	0.20	3.8	7.6	4.8	9.4	7.0	33
Detroit River									
204	A	0.38*	3.20*	7.4	39.0*	93.0*	33.0*	200.0*	210*
205	A	0.30*	0.20	3.1	6.0	8.4	8.9	7.2	34
206	A	0.13	0.20	2.3	4.8	3.3	6.1	7.2	21
207	A	0.04 t	0.40	6.0	15.0	22.0	17.0	32.0	70
208	A	0.29	0.20	5.0	12.0	13.0	14.0	17.0	49
209	C	0.30*	0.20	3.4	8.9	4.9	9.2	8.3	39
210	C	0.17	0.20	4.3	8.4	8.0	11.0	13.0	48
211	A	0.14	4.70*	8.9	130.0*	150.0*	55.0*	340.0*	550*
212	C	0.31*	0.80	4.9	14.0	39.0*	15.0	100.0*	150*
213	C	0.46*	1.00*	7.7	38.0*	30.0*	32.0*	46.0*	110*
214	C	0.20	0.80	6.3	20.0	25.0*	21.0*	48.0*	120*
215	C	0.31*	1.20*	7.0	22.0	57.0*	22.0*	150.0*	420*

Appendix 3. *(Continued)*

Station number	Jurisdiction	Hg	Cd	Co	Cr	Cu	Ni	Pb	Zn
216	A	0.43*	2.20*	5.8	59.0*	130.0*	56.0*	140.0*	200*
217	C	1.12*	0.90	8.0	25.0*	30.0*	28.0*	55.0*	130*
218	C	0.35*	0.80	8.6	29.0*	34.0*	33.0*	46.0*	160*
219	C	0.16	0.40	4.8	12.0	13.0	14.0	23.0	64
220	A	0.27	3.30*	6.6	58.0*	100.0*	38.0*	110.0*	340*
221	C	0.29	0.50	6.0	20.0	20.0	18.0	26.0	93*
222	A	0.22	0.30	5.3	13.0	10.0	13.0	11.0	43
223	C	0.17	0.30	4.6	12.0	14.0	14.0	24.0	51
224	A	0.32*	1.10*	6.7	32.0*	33.0*	28.0*	55.0*	140*
225	C	0.63*	0.30	3.1	8.0	8.0	10.0	11.0	34
226	A	0.22	0.20	6.6	12.0	12.0	15.0	14.0	42
227	C	0.65*	0.20	8.0	24.0	24.0	29.0*	37.0	78
228	A	0.30*	1.70*	7.2	47.0*	40.0*	40.0*	53.0*	170*
229	C	0.09	0.20	3.5	7.8	8.2	10.0	12.0	31
230	A	55.80*	33.00*	11.0	180.0*	120.0*	66.0*	360.0*	5300*
231	A	0.48*	1.20*	5.9	27.0*	23.0	22.0*	34.0	120*
232	C	0.11	0.30	3.8	9.5	11.0	12.0	21.0	55
233	A	1.16*	4.90*	7.1	92.0*	80.0*	62.0*	150.0*	820*
234	A	0.11	0.20	6.0	15.0	13.0	15.0	14.0	44
235	A	0.16	0.60	5.7	20.0	14.0	17.0	22.0	96*
236	A	3.45*	7.80*	11.0	260.0*	130.0*	130.0*	280.0*	750*
237	A	0.18	0.70	4.2	21.0	14.0	16.0	26.0	88
238	C	0.88*	2.10*	9.1	40.0*	67.0*	38.0*	76.0*	380*
239	A	0.07	0.50	3.6	14.0	13.0	13.0	29.0	58
240	A	0.47*	1.60*	8.2	53.0*	51.0*	34.0*	65.0*	210*
241	A	0.62*	4.60*	7.4	70.0*	68.0*	35.0*	71.0*	240*
242	A	0.08	0.80	4.4	25.0*	20.0	18.0	35.0	110*
243	A	0.66*	1.00*	8.2	32.0*	39.0*	30.0*	48.0*	140*
244	C	0.20	0.20	4.2	11.0	13.0	11.0	16.0	49
245	A	0.07	0.40	3.9	11.0	7.1	12.0	11.0	42
246	A	0.39*	1.20*	7.7	35.0*	37.0*	27.0*	46.0*	140*
247	C	0.91*	0.30	9.5	26.0*	33.0*	32.0*	43.0*	100*
248	A	0.80*	5.30*	7.1	69.0*	59.0*	50.0*	79.0*	480*
249	A	0.18	1.10*	5.5	25.0*	24.0	19.0	30.0	99*
250	C	0.79*	0.20	9.8	27.0*	31.0*	31.0*	41.0*	99*

Appendix 4. *Concentrations of organic contaminants (mg/kg) in sediments at 250 stations in the upper Great Lakes connecting channels in June 1985. The letter designation following the station number indicates whether the station was located in U.S. (A) or Canadian (C) waters. Values with an asterisk (*) exceed U.S. guidelines for moderately polluted sediments (oil and cyanide) or Canadian guidelines for polluted sediments (total PCB). Analytical results below the guideline of detection for a particular method are followed by a "t" code in conformance with established procedures for reporting low level data.*

Station number	Juris-diction	Oil	Total PCB	Aroclor 1242	Aroclor 1248	Aroclor 1254	Aroclor 1260	Phenol	Cyanide
St. Marys River									
1	C	300 t	0.000	0.000	0.000	0.000	0.000	0.0 t	0.0 t
2	C	9320 *	0.362*	0.000	0.174	0.188	0.000	8.2	3.3 t*
3	C	368 t	0.076*	0.000	0.000	0.076	0.000	0.1 t	0.0 t
4	A	8960 *	0.092*	0.000	0.000	0.092	0.000	11.0	2.7 *
5	C	975 t	0.025	0.000	0.000	0.025 t	0.000	0.1 t	0.1 t*
6	C	308 t	0.000	0.000	0.000	0.000	0.000	0.0 t	0.1 t*
7	C	801	0.026	0.000	0.000	0.026	0.000	0.2 t	0.1 t*
8	C	999 t	0.053*	0.000	0.000	0.053	0.000	0.2 t	0.2 t*
9	C	1330 *	0.000	0.000	0.000	0.000	0.000	0.3	0.4 t*
10	C	0 t	0.020	0.000	0.000	0.020	0.000	0.1 t	0.2 t*
11	C	5420 *	0.026	0.000	0.000	0.026	0.000	0.3	0.1 t*
12	C	3440 *	0.032	0.000	0.000	0.032	0.000	0.1 t	0.6 t*
13	A	6500 *	0.068*	0.000	0.000	0.068	0.000	0.8	0.3 t*
14	C	150 t	0.020	0.000	0.000	0.020	0.000	0.1 t	0.0 t
15	C	17 t	0.020	0.000	0.000	0.020	0.000	0.1 t	0.1 t*
16	C	0 t	0.000	0.000	0.000	0.000	0.000	0.8	0.2 t*
17	A	563 t	0.099*	0.000	0.066	0.033	0.000	0.0 t	0.2 t*
18	A	0 t	0.025	0.000	0.000	0.025	0.000	0.1 t	0.2 t*
19	A	0 t	0.020	0.000	0.000	0.020	0.000	0.0 t	0.0 t
20	C	1520 *	0.041	0.000	0.000	0.041	0.000	0.4	1.6 *
21	A	400 t	0.000	0.000	0.000	0.000	0.000	0.5	0.0 t
22	A	937 t	0.051*	0.000	0.000	0.051	0.000	0.3	0.7 t*
23	A	0 t	0.056*	0.000	0.000	0.056	0.000	0.3 t	0.4 t*
24	C	3720 *	0.025	0.000	0.000	0.025	0.000	0.1 t	0.2 t*
25	C	791	0.000	0.000	0.000	0.000	0.000	0.5	0.0 t
26	C	0 t	0.000	0.000	0.000	0.000	0.000	0.4	0.3 t*
27	A	278 t	0.023	0.000	0.000	0.023	0.000	0.1 t	0.1 t*
28	A	809	0.000	0.000	0.000	0.000	0.000	2.4	0.1 t*
29	C	2010 *	0.000	0.000	0.000	0.000	0.000	0.4	2.8 *
30	C	1370 *	0.000	0.000	0.000	0.000	0.000	0.1 t	0.8 t*
31	A	188 t	0.000	0.000	0.000	0.000	0.000	0.5	0.0 t
32	A	536 t	0.000	0.000	0.000	0.000	0.000	0.2	0.0 t
33	A	579 t	0.000	0.000	0.000	0.000	0.000	0.2	0.4 t*
34	A	949 t	0.070*	0.000	0.070	0.000	0.000	0.2 t	2.9 *
35	A	0 t	0.041	0.000	0.041	0.000	0.000	0.1 t	0.1 t*
36	A	805	0.065*	0.000	0.065	0.000	0.000	0.1 t	0.5 *
37	C	66 t	0.000	0.000	0.000	0.000	0.000	0.0 t	0.2 t*
38	C	0 t	0.000	0.000	0.000	0.000	0.000	0.0 t	0.1 t*
39	A	0 t	0.074*	0.000	0.074	0.000	0.000	0.0 t	0.2 t*
40	A	44 t	0.090*	0.000	0.090	0.000	0.000	0.0 t	0.1 t*

Appendix 4. *(Continued)*

Station number	Juris-diction	Oil	Total PCB	Aroclor 1242	Aroclor 1248	Aroclor 1254	Aroclor 1260	Phenol	Cyanide
41	A	172 t	0.000	0.000	0.000	0.000	0.000	0.0 t	0.4 t*
42	A	222 t	0.000	0.000	0.000	0.000	0.000	0.0 t	0.3 t*
43	C	364 t	0.000	0.000	0.000	0.000	0.000	0.1	0.1 t*
44	C	641	0.000	0.000	0.000	0.000	0.000	0.1	0.2 t*
45	A	320 t	0.000	0.000	0.000	0.000	0.000	0.1 t	0.1 t*
46	A	724	0.000	0.000	0.000	0.000	0.000	0.2	0.2 t*
47	A	441 t	0.000	0.000	0.000	0.000	0.000	0.1 t	0.1 t*
48	C	328 t	0.000	0.000	0.000	0.000	0.000	0.1 t	0.1 t*
49	A	284 t	0.039	0.000	0.000	0.039	0.000	0.1 t	0.1 t*
50	A	256 t	0.000	0.000	0.000	0.000	0.000	0.0 t	0.1 t*
51	A	581 t	0.049	0.000	0.000	0.049	0.000	0.2 t	0.2 t*
52	C	0 t	0.056*	0.000	0.056	0.000	0.000	0.9	0.2 t*
53	A	156 t	0.040	0.000	0.000	0.040	0.000	0.3	0.1 t*
54	A	311 t	0.000	0.000	0.000	0.000	0.000	0.6	0.1 t*
55	A	205 t	0.000	0.000	0.000	0.000	0.000	0.1	0.2 t*
56	C	1750*	0.056*	0.000	0.000	0.056	0.000	0.3	1.4 t*
57	A	798	0.000	0.000	0.000	0.000	0.000	0.1 t	0.1 t*
58	A	54 t	0.000	0.000	0.000	0.000	0.000	0.1	0.1 t*
59	A	5090*	0.020	0.000	0.020 t	0.000	0.000	0.1 t	0.3 t*
60	C	320 t	0.046	0.000	0.046	0.000	0.000	0.2 t	0.2 t*
61	A	0 t	0.101*	0.000	0.101	0.000	0.000	0.2	0.1 t*
62	A	235 t	0.055*	0.000	0.055	0.000	0.000	1.8	0.0 t
63	A	236 t	3.306*	0.000	0.000	2.240	1.066	0.2	0.1 t*
64	A	537 t	0.061*	0.000	0.000	0.061	0.000	0.1 t	0.3 t*
65	C	10800*	0.049	0.000	0.000	0.049	0.000	0.1 t	0.3 t*
66	C	347 t	0.035	0.000	0.000	0.035	0.000	0.0 t	0.2 t*
67	A	574 t	0.033	0.000	0.000	0.033	0.000	0.1 t	0.2 t*
68	A	191 t	0.050*	0.000	0.000	0.050	0.000	0.1 t	0.0 t
69	C	501 t	0.034	0.000	0.000	0.034	0.000	0.0 t	0.3 t*
70	C	510 t	0.070*	0.000	0.000	0.070	0.000	0.1 t	0.3 t*
71	C	1200*	0.086*	0.000	0.000	0.086	0.000	1.2	0.5 t*
72	A	16500*	0.031	0.000	0.000	0.031	0.000	0.6	0.1 t*
73	A	211 t	0.125*	0.000	0.125	0.000	0.000	0.2	0.1 t*
74	A	217 t	0.054*	0.000	0.054	0.000	0.000	0.2	0.1 t*
75	C	442 t	0.123*	0.000	0.123	0.000	0.000	0.1	0.2 t*
76	A	434 t	0.145*	0.000	0.145	0.000	0.000	0.1 t	0.0 t
77	A	479 t	0.052*	0.000	0.052	0.000	0.000	0.4	0.1 t*
78	A	619 t	0.041	0.000	0.041	0.000	0.000	1.3	0.0 t
79	C	573 t	0.077*	0.000	0.077	0.000	0.000	0.3	0.0 t
80	A	313 t	0.098*	0.000	0.098	0.000	0.000	0.7	0.1 t*
81	A	47 t	0.031	0.000	0.000	0.031	0.000	0.2	0.0 t
82	A	0 t	0.035	0.000	0.000	0.035	0.000	0.2	0.1 t*
83	A	0 t	0.045	0.000	0.000	0.045	0.000	0.4	0.0 t
84	C	0 t	0.043	0.000	0.000	0.043	0.000	0.1 t	0.1 t*
85	A	95 t	0.049	0.000	0.049	0.000	0.000	0.5	0.0 t

Appendix 4. *(Continued)*

Station number	Juris-diction	Oil	Total PCB	Aroclor 1242	Aroclor 1248	Aroclor 1254	Aroclor 1260	Phenol	Cyanide
86	A	222 t	0.038	0.000	0.038	0.000	0.000	0.2	0.0 t
87	A	499 t	0.033	0.000	0.033	0.000	0.000	0.3	0.0 t
88	A	0 t	0.033	0.000	0.033	0.000	0.000	0.2	0.1 t*
89	A	0 t	0.098*	0.000	0.052	0.046	0.000	0.4	0.1 t*
90	A	0 t	0.107*	0.000	0.057	0.050	0.000	0.1	0.0 t
91	A	0 t	0.055*	0.000	0.055	0.000	0.000	0.4	0.3 t*
92	A	0 t	0.047	0.000	0.047	0.000	0.000	0.1	0.1 t*
93	A	0 t	0.085*	0.000	0.044	0.041	0.000	0.1 t	0.0 t
94	A	951	0.097*	0.000	0.056	0.041	0.000	0.4	0.0 t
95	A	137 t	0.029	0.000	0.029	0.000	0.000	0.0 t	0.1 t*
96	A	0 t	0.041	0.000	0.1 t	0.1 t*			
97	A	0 t	0.030	0.000	0.000	0.030	0.000	0.1 t	0.7 t*
98	A	369 t	0.029	0.000	0.000	0.029	0.000	0.1 t	0.1 t*
99	A	0 t	0.035	0.000	0.000	0.035	0.000	0.1 t	0.0 t
100	A	235 t	0.037	0.000	0.000	0.037	0.000	0.1 t	0.1 t*
101	A	343 t	0.036	0.000	0.000	0.036	0.000	0.0 t	0.0 t
102	A	364 t	0.035	0.000	0.000	0.035	0.000	0.0 t	0.3 t*
103	A	310 t	0.031	0.000	0.000	0.031	0.000	0.1 t	0.1 t*
104	C	122 t	0.035	0.000	0.035	0.000	0.000	0.0 t	0.0 t
105	A	0 t	0.035	0.000	0.035	0.000	0.000	0.0 t	0.1 t*
106	A	88 t	0.036	0.000	0.036	0.000	0.000	0.8	0.0 t
107	C	0 t	0.031	0.000	0.000	0.031	0.000	0.2	0.0 t
108	A	47 t	0.025	0.000	0.000	0.025	0.000	0.1 t	0.1 t*
109	A	29 t	0.040	0.000	0.000	0.040	0.000	0.1 t	0.0 t
110	A	146 t	0.028	0.000	0.000	0.028	0.000	0.1 t	0.0 t
111	A	0 t	0.041	0.000	0.000	0.041	0.000	0.2 t	0.2 t*
112	C	144 t	0.029	0.000	0.000	0.029	0.000	0.2	0.2 t*
113	A	273 t	0.024	0.000	0.024	0.000	0.000	0.0 t	0.2 t*
114	A	410 t	0.047	0.000	0.000	0.047	0.000	0.1 t	0.1 t*
115	A	1066 *	0.052*	0.000	0.000	0.052	0.000	0.1 t	0.1 t*
116	A	1129 *	0.045	0.000	0.000	0.045	0.000	0.0 t	0.2 t*
117	A	1013t*	0.045	0.000	0.000	0.045	0.000	0.1 t	0.4 t*
118	A	438	t	0.031	0.000	0.000	0.031	0.000	0022 t*
119	A	1250	t*	0.039	0.000	0.000	0.039	0.000	0031 t*
120	A	744	t	0.032	0.000	0.000	0.032	0.000	0022t t*
121	A	454	t	0.035	0.000	0.000	0.035	0.000	0013 t*
122	A	424	t	0.031	0.000	0.000	0.031	0.000	0.12.5*
123	A	266	t	0.034	0.000	0.000	0.034	0.000	0011tt*
124	A	505	t	0.036	0.000	0.000	0.036	0.000	0011tt*
125	A	159	t	0.023	0.000	0.000	0.023	0.000	0011tt*
St. Clair River									
126	A	6	t	0.000	0.000	0.000	0.000	0.000	0000tt
127	C	44	t	0.030	0.000	0.000	0.030 t	0.000	0000tt
128	C	289	t	0.048	0.000	0.000	0.048	0.000	8010 t
129	A	291	t	0.048	0.000	0.000	0.048	0.000	0.[illegible] t*
130	C	2730	*	0.075*	0.000	0.000	0.075	0.000	3030 t

Appendix 4. *(Continued)*

Station number	Juris- diction	Oil	Total PCB	Aroclor 1242	Aroclor 1248	Aroclor 1254	Aroclor 1260	Phenol	Cyanide
131	A	293 t	0.078*	0.000	0.000	0.078	0.000	0.9	0.0 t
132	A	221 t	0.088*	0.000	0.000	0.088	0.000	1.5	0.0 t
133	A	209 t	0.000	0.000	0.000	0.000	0.000	0.4	0.0 t
134	A	265 t	0.108*	0.000	0.000	0.108	0.000	0.8	0.0 t
135	A	215 t	0.000	0.000	0.000	0.000	0.000	0.3	0.0 t
136	C	244 t	0.069*	0.000	0.000	0.069	0.000	0.2 t	0.0 t
137	A	641	0.127*	0.000	0.000	0.127	0.000	0.2 t	0.2 t*
138	C	277 t	0.059*	0.000	0.000	0.059	0.000	0.2 t	0.1 t*
139	A	191 t	0.040	0.000	0.000	0.040	0.000	0.6	0.0 t
140	C	208 t	0.074*	0.000	0.000	0.074	0.000	0.5	0.0 t
141	C	499 t	0.125*	0.000	0.000	0.125	0.000	0.4	0.0 t
142	C	224 t	0.073*	0.000	0.000	0.073	0.000	0.4	0.0 t
143	A	232 t	0.070*	0.000	0.000	0.070	0.000	0.4	0.0 t
144	C	3130 *	0.034	0.000	0.000	0.034	0.000	0.5	0.0 t
145	A	49 t	0.037	0.000	0.000	0.037	0.000	0.1 t	0.0 t
146	C	155 t	0.068*	0.000	0.000	0.068	0.000	0.3	0.0 t
147	A	77 t	0.050*	0.000	0.000	0.050	0.000	0.1 t	0.0 t
148	C	478	0.055*	0.000	0.000	0.055	0.000	0.1 t	0.0 t
149	A	95 t	0.044	0.000	0.000	0.044	0.000	0.2 t	0.0 t
150	C	194 t	0.073*	0.000	0.000	0.073	0.000	0.2 t	0.0 t
151	C	183 t	0.030	0.000	0.000	0.030 t	0.000	0.6	0.0 t
152	C	0 t	0.051*	0.000	0.000	0.051	0.000	0.0 t	0.0 t
153	C	108 t	0.030	0.000	0.000	0.030 t	0.000	0.0 t	0.0 t
154	A	14 t	0.030	0.000	0.000	0.030 t	0.000	0.0 t	0.0 t
155	A	212 t	0.043	0.000	0.000	0.043	0.000	0.2 t	0.0 t
156	C	41 t	0.035	0.000	0.000	0.035	0.000	0.4	0.0 t
157	A	143 t	0.042	0.000	0.000	0.042	0.000	0.4	0.0 t
158	A	346 t	0.039	0.000	0.000	0.039	0.000	2.4	0.1 t*
159	A	273 t	0.045	0.000	0.045	0.000	0.000	0.4	0.0 t
160	A	321 t	0.030	0.000	0.000	0.030 t	0.000	0.9	0.1 t*
Lake St. Clair									
161	A	189 t	0.030	0.000	0.000	0.030 t	0.000	0.5	0.1 t*
162	A	272 t	0.030	0.000	0.000	0.030 t	0.000	0.4	0.0 t
163	A	189 t	0.030	0.000	0.000	0.030 t	0.000	0.0 t	0.0 t
164	A	216 t	0.036	0.000	0.036	0.000	0.000	0.8	0.0 t
165	A	231 t	0.030	0.000	0.030 t	0.000	0.000	0.0 t	0.0 t
166	A	135 t	0.075*	0.000	0.040	0.035	0.000	0.3	0.1 t*
167	A	342 t	0.200*	0.000	0.000	0.200	0.000	2.8	0.8 t*
168	A	229 t	0.080*	0.000	0.030 t	0.050	0.000	0.4	0.1 t*
169	A	0 t	0.000	0.000	0.000	0.000	0.000	0.9	0.1 t*
170	A	152 t	0.000	0.000	0.000	0.000	0.000	0.7	0.1 t*
171	A	0 t	0.030	0.000	0.000	0.030 t	0.000	0.6	0.1 t*
172	A	7 t	0.030	0.000	0.000	0.030 t	0.000	0.8	0.1 t*
173	A	287 t	0.030	0.000	0.000	0.030 t	0.000	0.9	0.1 t*
174	C	96 t	0.000	0.000	0.000	0.000	0.000	0.2	0.1 t*
175	A	610	0.200*	0.000	0.120	0.080	0.000	1.3	0.1 t*

Appendix 4. *(Continued)*

Station number	Juris-diction	Oil	Total PCB	Aroclor 1242	Aroclor 1248	Aroclor 1254	Aroclor 1260	Phenol	Cyanide
176	A	242 t	0.030	0.000	0.000	0.030 t	0.000	0.9	0.2 t*
177	C	597	0.071*	0.000	0.000	0.071	0.000	0.5	0.1 t*
178	C	146 t	0.000	0.000	0.000	0.000	0.000	0.1	0.0 t
179	C	45 t	0.000	0.000	0.000	0.000	0.000	0.0 t	0.0 t
180	C	0 t	0.030	0.000	0.000	0.030 t	0.000	0.3	0.0 t
181	A	99 t	0.042	0.000	0.000	0.042	0.000	0.3	0.0 t
182	A	247 t	0.075*	0.000	0.043	0.032	0.000	0.4	0.0 t
183	C	307 t	0.039	0.000	0.000	0.039	0.000	0.1 t	0.0 t
184	C	82 t	0.030	0.000	0.000	0.030 t	0.000	0.1 t	0.0 t
185	C	0 t	0.000	0.000	0.000	0.000	0.000	0.1	0.0 t
186	C	69 t	0.030	0.000	0.000	0.030 t	0.000	0.1	0.0 t
187	A	310 t	0.062*	0.000	0.062	0.000	0.000	0.6	0.1 t*
188	A	99 t	0.030	0.000	0.000	0.030 t	0.000	0.3	0.0 t
189	C	0 t	0.044	0.000	0.000	0.044	0.000	0.1 t	0.1 t*
190	C	162 t	0.041	0.000	0.000	0.041	0.000	0.2 t	0.1 t*
191	C	110 t	0.045	0.000	0.000	0.045	0.000	0.2	0.1 t*
192	C	0 t	0.030	0.000	0.000	0.030 t	0.000	0.2	0.0 t
193	A	0 t	0.030	0.000	0.000	0.030 t	0.000	0.3	0.0 t
194	C	91 t	0.042	0.000	0.000	0.042	0.000	0.2	0.1 t*
195	C	29 t	0.039	0.000	0.000	0.039	0.000	0.1 t	0.1 t*
196	C	83 t	0.058*	0.000	0.000	0.058	0.000	0.0 t	0.1 t*
197	C	112 t	0.030	0.000	0.000	0.030 t	0.000	0.1	0.0 t
198	C	637	0.030	0.000	0.000	0.030 t	0.000	0.0	0.1 t*
199	C	26 t	0.030	0.000	0.000	0.030 t	0.000	0.0	0.1 t*
200	C	186 t	0.030	0.000	0.000	0.030 t	0.000	0.4	0.1 t*
201	C	0 t	0.000	0.000	0.000	0.000	0.000	0.0	0.6 t*
202	C	140 t	0.030	0.000	0.000	0.030 t	0.000	0.1	0.5 t*
203	C	220 t	0.030	0.000	0.000	0.030 t	0.000	0.2	0.6 t*
Detroit River									
204	A	2490 *	0.358*	0.000	0.169	0.000	0.189	0.4	0.1 t*
205	A	217 t	0.032	0.000	0.000	0.032	0.000	0.1 t	0.0 t
206	A	289 t	0.000	0.000	0.000	0.000	0.000	0.1 t	0.0 t
207	A	564 t	0.105*	0.000	0.000	0.105 t	0.000	0.1 t	0.0 t
208	A	250 t	0.030	0.000	0.000	0.030 t	0.000	0.3	0.0 t
209	C	161 t	0.030	0.000	0.000	0.030 t	0.000	0.1 t	0.0 t
210	C	124 t	0.000	0.000	0.000	0.000	0.000	0.6	0.0 t
211	A	6660 *	5.410*	0.000	0.000	1.900	3.510	1.1	0.5 t*
212	C	471	0.165*	0.000	0.053	0.112	0.000	0.7	0.1 t*
213	C	509 t	0.074*	0.000	0.000	0.074	0.000	0.9	0.0 t
214	C	857	0.249*	0.000	0.141	0.108	0.000	0.6	0.1 *
215	C	1210 *	0.153*	0.000	0.083	0.070	0.000	0.6	0.0 t
216	A	2660 *	4.000*	0.000	0.740	0.960	2.300	1.1	2.0 *
217	C	716 t	0.300*	0.000	0.150	0.150	0.000	1.1	0.1 t*
218	C	38 t	0.231*	0.000	0.106	0.125	0.000	0.9	0.1 t*
219	C	253 t	0.135*	0.000	0.092	0.043	0.000	0.4	0.0 t
220	A	3390 *	1.038*	0.000	0.186	0.466	0.386	0.2 t	0.4 t*

Appendix 4. *(Continued)*

Station number	Juris-diction	Oil	Total PCB	Aroclor 1242	Aroclor 1248	Aroclor 1254	Aroclor 1260	Phenol	Cyanide
221	C	408 t	0.053*	0.000	0.000	0.053	0.000	0.4	0.1 *
222	A	91 t	0.000	0.000	0.000	0.000	0.000	0.3	0.1 *
223	C	413 t	0.074*	0.000	0.000	0.074	0.000	0.2 t	0.2 t*
224	A	1290 *	0.707*	0.000	0.122	0.000	0.585	0.2 t	0.2 t*
225	C	46 t	0.099*	0.000	0.056	0.043	0.000	0.2 t	0.0 t
226	A	140 t	0.083*	0.000	0.049	0.034	0.000	0.2 t	0.1 t*
227	C	297 t	0.136*	0.000	0.076	0.060	0.000	0.2 t	0.1 t*
228	A	1270 *	0.443*	0.000	0.000	0.258	0.185	0.2 t	0.2 t*
229	C	160 t	0.041	0.000	0.000	0.041	0.000	0.2	0.0 t
230	A	24100 *	2.363*	0.000	0.519	1.130	0.714		6.4 *
231	A	263 t	0.310*	0.000	0.103	0.127	0.080	0.1 t	0.1 t*
232	C	118 t	0.132*	0.000	0.067	0.000	0.065	0.2 t	0.1 t*
233	A	2130 *	2.152*	0.000	0.000	1.300	0.852	0.4	1.0 *
234	A	312 t	0.146*	0.000	0.085	0.061	0.000	0.2 t	0.1 t*
235	A	173 t	0.202*	0.000	0.105	0.000	0.097	0.2	0.2 t*
236	A	13300 *	9.130*	0.000	7.166	0.000	1.964	0.6	15.7 *
237	A	305 t	0.000	0.000	0.000	0.000	0.000	0.2	0.2 t*
238	C	840 t	0.322*	0.000	0.170	0.152	0.000	0.4 t	0.2 t*
239	A	14 t	0.336*	0.000	0.130	0.135	0.071	0.2 t	0.2 t*
240	A	2260 *	0.702*	0.000	0.109	0.389	0.204	0.1 t	0.9 t*
241	A	1980 *	0.795*	0.000	0.165	0.393	0.237	0.1 t	1.0 *
242	A	264 t	0.400*	0.000	0.000	0.200	0.200	0.0 t	0.5 t*
243	A	1210 *	0.350*	0.000	0.088	0.176	0.086	0.0 t	0.4 t*
244	C	124 t	0.957*	0.000	0.457	0.000	0.500	0.0 t	0.1 t*
245	A	387 t	0.200*	0.000	0.141	0.000	0.059	0.1 t	0.2 t*
246	A	448 t	0.344*	0.000	0.089	0.147	0.108	0.2 t	0.5 t*
247	C	170 t	0.154*	0.000	0.094	0.060	0.000	0.1 t	0.2 t*
248	A	370 t	0.287*	0.000	0.000	0.166	0.121	0.1 t	2.0 *
249	A	430 t	0.359*	0.000	0.105	0.150	0.104	0.0 t	0.2 t*
250	C	134 t	0.178*	0.000	0.107	0.071	0.000	0.6	0.1 t*

Appendix 5. *Sediment grain size distribution and percent total solids and volatile solids in sediments at 250 stations in the upper Great Lakes connecting channels in June 1985. The letter designation following the station number indicates whether the station was located in U.S. (A) or Canadian (C) waters. Values with an asterisk (*) exceed U.S. guidelines for moderately polluted sediments (volatile solids). Dash (-) means no data. Sediment grain sizes are reported as % of total mass retained on each sieve size, or passed by a number 200 mesh sieve.*

Station number and jurisdiction		Sieve size 3/8	4	10	16	28	50	100	200	200 (passed)	Total %	Total solids	Volatile solids
St. Marys River													
1	C	0.0	0.0	0.6	0.3	1.5	5.5	6.4	14.8	71.0	100.1	49.22	3.08
2	C	-	-	-	-	-	-	-	-	-	-	15.82	17.62*
3	C	0.0	0.0	0.1	0.1	0.3	3.2	46.4	17.7	32.1	99.9	62.65	1.57
4	A	0.0	0.0	1.8	5.1	20.2	9.5	9.7	21.7	32.0	100.0	22.23	13.42*
5	C	0.1	0.0	0.1	0.2	0.5	20.5	54.9	16.4	7.3	100.0	29.58	5.17*
6	C	0.0	0.0	0.2	0.4	1.0	14.6	42.7	27.6	13.6	100.1	54.93	4.16
7	C	0.0	0.0	0.5	0.5	0.4	3.5	44.3	23.9	26.9	100.0	58.67	1.84
8	C	0.0	0.0	1.4	1.0	7.4	8.0	15.7	22.0	44.5	100.0	34.44	8.77*
9	C	0.0	0.0	1.0	2.0	0.5	0.7	5.8	26.8	63.1	99.9	60.45	8.29*
10	C	0.0	0.0	0.7	1.3	1.5	3.6	33.9	33.1	26.0	100.1	56.33	3.48
11	C	0.0	0.0	1.3	2.3	1.9	4.9	10.2	30.1	49.3	100.0	32.13	15.07*
12	C	0.0	0.0	0.3	0.2	0.6	2.5	9.4	44.3	42.7	100.0	38.53	8.24*
13	A	0.0	1.6	2.3	5.8	15.2	7.8	8.9	18.8	39.5	99.9	21.70	13.94*
14	C	0.0	0.0	0.4	0.2	0.2	28.9	46.9	7.6	15.8	100.0	63.27	1.25
15	C	0.0	0.0	0.0	0.0	0.2	4.5	42.5	31.3	21.5	100.0	59.25	1.85
16	C	0.0	0.0	0.2	0.1	0.1	0.2	38.5	46.3	14.7	100.1	62.90	1.00
17	A	0.0	0.0	0.0	3.6	3.7	11.5	9.6	23.2	48.3	99.9	60.41	2.56
18	A	0.0	0.0	0.0	0.8	3.9	6.3	9.9	33.3	45.7	99.9	52.85	2.73
19	A	0.0	0.0	0.4	0.1	0.2	1.5	17.8	41.3	38.8	100.1	65.85	1.48
20	C	0.0	0.0	0.4	0.6	1.2	5.0	16.3	26.8	49.6	99.9	46.88	7.70*
21	A	0.0	0.0	0.5	0.4	0.6	5.3	7.7	27.4	58.0	99.9	34.14	7.86*
22	A	0.0	0.0	0.3	0.7	5.7	8.7	12.6	17.0	55.0	100.0	42.06	3.88
23	A	0.0	0.0	0.5	9.4	3.0	5.0	13.3	19.1	49.6	99.9	27.09	7.58*
24	C	0.8	0.0	0.5	0.1	0.8	15.3	54.1	16.8	11.5	99.9	69.20	0.98
25	C	0.0	0.0	0.3	0.3	1.2	13.3	82.4	2.4	0.1	100.0	75.45	0.25
26	C	0.0	0.0	0.8	5.4	5.6	4.6	7.0	20.3	56.4	100.1	34.71	6.51*
27	A	0.0	0.0	0.1	0.1	0.2	1.8	16.7	31.8	49.2	99.9	67.43	1.44
28	A	0.0	0.1	0.0	0.1	0.3	2.9	40.8	25.8	30.1	100.1	63.63	1.15
29	C	0.0	0.0	1.1	10.4	11.6	16.8	16.0	13.4	30.4	99.7	27.37	7.40*
30	C	0.0	0.0	0.0	0.7	8.0	3.7	5.4	26.5	56.4	100.7	43.92	4.47
31	A	0.0	0.0	0.3	0.2	0.8	17.4	39.9	22.7	18.6	99.9	62.91	1.57
32	A	0.0	0.1	2.2	5.0	3.1	8.9	16.7	25.3	38.7	100.0	56.35	2.31
33	A	0.0	0.0	0.1	4.8	2.2	29.6	16.0	29.2	18.2	100.1	39.34	3.48
34	A	0.0	0.0	17.7	21.2	6.9	5.9	8.9	18.4	21.0	100.0	26.56	9.21*
35	A	0.0	0.0	21.8	8.1	4.1	10.6	17.8	30.2	7.2	99.8	48.62	2.26
36	A	0.0	0.0	2.1	0.5	1.0	12.3	11.0	24.5	48.5	99.9	43.04	4.03
37	C	0.0	1.6	0.7	0.8	0.5	2.0	63.6	28.3	2.6	100.1	68.19	0.67
38	C	0.0	0.0	0.0	0.0	0.1	3.2	76.7	16.7	3.2	99.9	67.36	0.66
39	A	0.0	0.0	0.0	0.1	0.5	0.7	1.8	55.3	41.7	100.1	67.13	0.85
40	A	0.0	0.0	0.2	3.6	5.0	3.1	6.8	19.2	61.6	99.5	64.68	1.65

Appendix 5. *(Continued)*

Station number and jurisdiction		3/8	Sieve size 4	10	16	28	50	100	200	200 (passed)	Total %	Total solids	Volatile solids
41	A	0.0	0.0	0.2	2.3	4.2	2.2	2.2	31.9	56.9	99.9	68.49	1.27
42	A	0.0	0.0	0.0	0.1	1.5	1.4	6.6	58.0	32.4	100.0	66.08	0.67
43	C	0.0	0.0	0.1	0.3	0.6	2.0	48.0	32.3	16.6	99.9	68.72	1.01
44	C	0.0	0.0	0.0	0.1	0.2	0.2	43.0	44.9	11.5	99.9	67.42	1.33
45	A	0.0	0.0	0.0	2.3	2.4	4.2	4.7	21.2	65.2	100.0	65.93	1.78
46	A	0.0	0.0	0.0	0.1	0.1	2.9	15.5	54.8	26.2	99.6	63.83	1.04
47	A	0.0	0.0	0.2	0.1	0.1	0.2	29.9	60.2	9.4	100.1	60.96	0.67
48	C	0.0	0.0	0.3	1.8	2.4	15.5	58.4	19.7	1.9	100.0	66.69	1.25
49	A	0.0	0.0	0.2	0.8	5.6	5.6	4.0	30.2	52.8	99.2	65.73	1.98
50	A	0.0	0.0	0.4	2.3	8.0	25.4	42.9	10.2	10.5	99.7	69.18	1.18
51	A	0.0	0.0	0.2	1.4	10.4	12.2	10.0	18.4	47.6	100.2	39.41	3.88
52	C	0.0	0.4	1.0	5.6	8.2	4.8	16.4	50.8	12.4	99.6	63.32	1.38
53	A	0.0	0.0	2.0	3.6	15.0	29.0	24.6	8.0	16.8	99.0	66.50	1.09
54	A	0.0	0.0	0.0	0.6	2.6	3.0	11.6	34.2	47.2	99.2	63.05	1.06
55	A	0.0	0.0	0.0	3.2	10.0	11.6	12.0	20.2	41.8	98.8	64.69	1.36
56	C	0.0	0.0	11.2	20.4	20.4	13.2	8.8	7.2	16.4	97.6	25.97	7.05*
57	A	0.0	0.4	1.4	5.8	6.4	4.2	8.0	45.8	27.8	99.8	66.67	1.13
58	A	0.0	0.0	3.6	9.6	8.8	5.0	5.6	28.0	39.0	99.6	63.42	1.33
59	A	0.0	1.0	6.8	5.2	5.2	10.2	52.2	13.0	5.4	99.0	65.31	1.07
60	C	0.0	2.0	23.2	19.6	22.0	11.6	7.2	5.2	6.8	97.6	34.93	25.85*
61	A	0.0	0.0	10.2	7.8	10.0	5.8	7.4	18.0	39.4	98.6	60.85	1.39
62	A	0.0	0.7	0.3	0.1	1.6	30.1	62.8	3.2	0.3	99.1	72.02	0.66
63	A	0.0	0.0.	9.2	2.4	21.4	20.4	11.6	12.6	21.4	99.0	47.43	3.03
64	A	0.0	0.8	17.0	7.4	15.6	6.6	4.2	13.4	33.0	98.0	47.46	2.91
65	C	0.0	1.2	22.2	5.6	11.6	5.8	5.8	10.6	36.8	99.6	52.42	2.10
66	C	0.0	2.0	16.2	3.4	10.2	4.2	1.2	8.0	53.4	98.6	55.14	2.96
67	A	0.0	1.2	37.0	17.4	16.0	8.0	6.8	3.4	13.0	102.8	52.94	2.91
68	A	0.0	0.0	8.6	2.2	12.6	10.8	8.2	17.0	40.4	99.8	65.80	1.82
69	C	0.0	0.4	5.6	5.6	22.0	13.2	12.0	15.6	18.0	92.4	39.93	3.37
70	C	0.0	0.0	19.4	16.6	17.2	8.2	4.0	5.8	27.8	99.0	42.11	4.25
71	C	0.0	0.6	17.6	13.8	26.6	14.2	6.8	6.0	12.4	98.0	28.39	6.04*
72	A	0.0	0.0	0.5	0.2	3.4	10.5	53.4	14.7	16.5	99.2	71.19	1.01
73	A	0.0	1.0	8.3	3.0	12.0	10.4	7.7	8.3	49.3	100.0	67.16	1.56
74	A	0.0	1.0	8.0	5.0	16.6	11.2	6.4	12.8	39.8	100.8	52.54	2.75
75	C	0.0	0.0	2.9	1.0	6.5	4.3	28.5	22.9	33.6	99.7	64.48	1.75
76	A	0.0	0.8	18.4	10.6	20.0	19.4	13.8	11.8	6.2	101.0	59.13	1.83
77	A	0.0	2.0	4.4	1.7	9.2	9.8	20.1	16.8	36.8	100.8	65.40	1.69
78	A	0.0	0.4	9.2	7.6	17.0	9.6	7.4	9.4	41.8	102.4	47.31	3.11
79	C	0.0	0.0	0.0	0.0	0.6	0.8	1.4	20.0	69.0	91.8	54.21	3.76
80	A	0.0	0.0	0.4	1.2	2.0	2.6	7.8	21.0	64.8	99.8	45.93	3.10
81	A	0.0	0.0	0.0	0.0	0.2	0.2	3.2	32.4	60.4	96.4	62.76	1.86
82	A	0.0	0.0	0.2	0.0	0.6	14.4	18.4	26.2	40.2	100.0	61.79	1.70
83	A	0.0	0.0	0.2	0.6	1.6	2.4	7.0	19.0	68.6	99.4	46.44	3.26
84	C	0.0	0.2	0.0	0.0	1.6	17.0	47.4	23.2	10.2	99.6	59.80	2.35
85	A	0.0	0.0	0.2	0.4	0.8	12.4	20.8	38.0	27.6	100.2	52.09	3.14

Appendix 5. *(Continued)*

Station number and jurisdiction		3/8	Sieve size							200 (passed)	Total %	Total solids	Volatile solids
			4	10	16	28	50	100	200				
86	A	0.0	0.0	0.0	0.2	5.9	31.8	35.9	22.4	4.0	100.2	66.57	1.56
87	A	0.0	0.0	0.0	0.0	0.4	4.8	23.4	59.8	11.4	99.8	61.80	2.39
88	A	0.0	4.4	0.9	0.0	2.1	16.1	22.8	13.6	39.8	99.7	57.13	1.96
89	A	0.0	0.0	0.0	0.6	2.0	1.8	8.0	19.2	67.2	98.8	47.54	2.89
90	A	0.0	0.0	0.0	0.3	8.3	28.6	24.2	28.5	10.2	100.1	54.42	3.62
91	A	0.0	0.4	0.0	0.0	0.4	8.0	23.2	45.8	21.8	99.6	45.32	4.63
92	A	0.0	0.8	0.1	0.0	1.1	15.5	45.6	26.4	10.6	99.8	67.28	1.55
93	A	0.0	0.0	0.6	2.8	13.6	19.6	25.2	27.2	11.2	100.2	47.91	3.83
94	A	0.0	0.0	0.0	0.4	21.8	27.0	20.0	22.0	8.8	100.0	60.37	2.57
95	A	0.0	0.0	0.2	0.2	0.6	10.1	22.7	41.2	26.4	101.4	71.39	1.25
96	A	0.0	0.0	0.8	0.0	0.6	4.0	8.0	13.2	72.4	99.0	44.32	3.75
97	A	0.0	0.0	1.2	0.4	0.6	5.0	13.0	21.2	58.4	99.8	47.90	2.75
98	A	0.0	0.0	0.0	0.2	0.4	4.0	12.6	22.8	60.2	100.2	52.12	2.96
99	A	1.4	0.3	0.2	0.0	4.2	30.5	23.3	29.9	10.0	99.8	68.67	2.05
100	A	0.0	0.0	0.0	0.2	0.6	1.4	7.6	29.0	61.0	99.8	45.04	3.31
101	A	0.0	0.0	0.2	0.8	0.5	3.0	12.5	22.8	60.5	100.3	37.82	4.09
102	A	0.0	0.0	1.0	1.0	1.5	3.5	12.5	35.8	44.5	99.8	35.46	4.42
103	A	0.0	0.0	0.0	0.0	0.5	3.5	10.5	24.0	61.0	99.5	39.04	4.32
104	C	0.0	0.0	0.0	0.0	0.5	7.4	31.5	46.1	14.3	99.8	71.46	1.22
105	A	0.0	0.0	0.3	0.1	2.8	30.7	25.8	18.3	22.0	100.0	73.16	1.58
106	A	0.0	0.0	0.6	0.8	1.4	6.2	10.6	21.4	58.8	99.8	50.03	2.83
107	C	0.0	0.0	0.4	0.0	0.4	3.4	13.2	26.2	56.2	99.8	43.96	3.06
108	A	0.0	0.0	0.2	0.5	6.7	13.2	10.2	36.5	32.9	100.2	62.99	1.95
109	A	0.0	0.0	0.0	0.0	1.1	6.0	14.9	31.4	45.7	99.1	34.60	4.37
110	A	0.0	1.0	0.0	0.0	0.4	5.8	14.8	25.4	52.6	100.0	49.25	3.31
111	A	0.0	0.0	0.8	0.2	1.0	11.0	13.0	37.5	35.5	99.0	34.57	4.38
112	C	0.0	0.0	2.4	0.4	4.8	9.0	21.6	40.2	20.6	99.0	48.30	3.90
113	A	0.0	0.0	0.0	0.0	0.1	5.6	50.4	34.0	9.7	99.8	67.20	0.64
114	A	0.0	0.0	0.0	0.0	0.3	5.3	17.3	35.7	40.4	99.0	32.62	4.74
115	A	0.0	0.0	0.0	0.3	0.3	4.0	20.3	29.7	44.3	98.9	33.56	3.91
116	A	0.0	0.0	0.7	0.3	1.0	5.0	14.3	25.7	62.0	109.0	30.08	4.85
117	A	0.0	0.0	0.0	0.0	0.5	9.8	25.0	25.8	41.2	102.3	31.56	4.12
118	A	0.0	0.0	0.6	0.0	0.6	4.4	26.0	25.6	49.0	106.2	39.23	3.19
119	A	0.0	0.0	0.0	0.5	1.0	5.0	15.5	36.0	43.0	101.0	27.29	5.00*
120	A	0.0	0.0	0.0	0.3	1.4	7.4	19.1	29.7	42.3	100.2	27.71	4.79
121	A	0.0	0.0	0.0	0.0	0.6	19.8	34.2	19.6	26.0	100.2	47.36	1.94
122	A	0.0	0.0	0.2	0.8	2.0	10.0	22.8	30.0	35.5	101.3	29.50	4.17
123	A	0.0	0.0	0.3	0.0	0.6	4.0	14.0	29.4	51.7	100.0	31.95	4.58
124	A	0.0	0.0	0.0	0.3	1.0	5.7	17.3	37.0	39.0	100.3	29.66	4.47
125	A	0.0	0.0	0.0	0.0	0.3	8.8	43.0	38.3	9.5	99.9	69.17	1.24
St. Clair River													
126	A	0.0	2.8	12.5	4.8	13.9	25.3	34.5	3.2	2.7	99.7	84.30	0.23
127	C	0.0	0.0	0.0	0.0	0.5	1.6	33.6	36.6	26.8	99.1	65.88	1.11
128	C	0.0	0.0	0.3	0.1	0.3	0.6	10.1	43.0	45.4	99.8	56.02	1.98
129	A	0.0	0.3	1.0	0.3	0.5	1.2	6.7	61.2	28.7	99.9	60.06	2.27
130	C	3.3	9.7	2.0	0.6	6.1	13.0	16.0	17.1	32.0	99.8	58.72	2.81

Appendix 5. *(Continued)*

Station number and jurisdiction		3/8	Sieve size							200 (passed)	Total %	Total solids	Volatile solids
			4	10	16	28	50	100	200				
131	A	0.0	0.1	0.1	0.1	0.2	0.6	7.9	52.0	38.6	99.6	67.34	1.56
132	A	0.0	0.0	0.6	1.6	1.8	3.2	5.2	14.8	72.2	99.4	49.17	3.11
133	A	0.0	0.0	0.0	0.1	0.2	0.6	41.7	42.7	14.7	100.0	70.64	2.02
134	A	0.0	0.0	0.0	0.1	0.1	0.6	5.3	58.6	35.1	99.8	64.04	1.01
135	A	0.0	0.0	0.5	0.2	0.3	2.4	59.1	24.2	13.4	100.1	72.97	1.23
136	C	0.0	1.1	0.0	0.0	0.2	0.9	6.6	75.3	15.4	99.5	64.64	1.58
137	A	0.0	0.0	0.4	0.2	0.4	7.6	23.4	49.6	15.5	97.1	64.37	1.61
138	C	0.0	0.0	0.0	0.0	0.1	1.2	15.2	71.6	11.9	100.0	70.06	1.02
139	A	0.0	0.0	0.0	0.0	0.3	7.8	63.5	17.9	10.0	99.5	76.60	0.41
140	C	0.0	1.8	1.2	0.4	2.5	11.9	38.8	34.1	9.0	99.7	68.62	1.51
141	C	0.0	0.0	0.6	0.4	0.6	10.1	31.1	46.7	10.3	99.8	65.59	1.70
142	C	0.0	0.0	0.2	0.1	0.2	1.8	35.9	46.3	16.0	100.5	66.27	6.85*
143	A	0.0	0.0	3.1	2.5	7.1	18.2	31.9	33.6	3.2	99.6	75.79	2.01
144	C	0.0	0.4	0.5	0.2	0.8	13.0	43.6	35.1	5.9	99.5	59.43	5.10*
145	A	0.0	0.4	0.1	0.1	0.3	6.8	26.2	53.5	12.5	99.9	69.90	1.59
146	C	0.0	0.0	3.5	2.6	7.7	42.1	29.6	10.0	4.3	99.8	76.82	1.69
147	A	0.0	0.0	0.0	0.1	0.3	2.9	41.5	38.9	16.4	100.1	70.31	1.56
148	C	0.0	0.0	0.1	0.1	0.4	18.2	39.2	37.6	4.1	99.7	71.13	1.49
149	A	0.0	0.0	0.1	0.6	0.5	6.6	26.6	53.4	12.0	99.8	60.98	3.83
150	C	0.0	0.0	0.0	0.5	0.4	1.5	27.9	40.5	29.6	100.4	54.00	3.80
151	C	0.0	0.0	0.1	0.2	0.2	0.8	37.8	48.7	12.4	100.2	68.56	1.86
152	C	0.0	0.0	0.1	0.1	0.2	2.2	18.0	69.7	9.6	99.9	69.85	1.59
153	C	0.0	0.0	0.0	0.0	0.1	0.6	37.8	50.7	10.8	100.0	69.46	1.36
154	A	0.0	0.0	0.0	0.0	0.2	4.4	16.8	65.5	12.9	99.8	67.34	1.04
155	A	0.0	0.0	0.5	0.0	0.1	1.0	12.4	60.6	25.4	100.0	62.47	2.71
156	C	0.0	0.0	0.0	0.0	0.1	1.1	17.9	70.5	10.1	99.7	69.79	1.69
157	A	0.0	0.0	0.7	0.1	0.5	0.6	2.8	66.6	28.2	99.5	60.38	2.85
158	A	0.0	0.5	0.5	0.1	0.3	1.0	8.7	74.8	14.4	100.3	59.75	2.72
159	A	0.0	0.0	0.2	0.2	1.9	2.1	6.2	61.2	27.6	99.4	53.14	3.77
160	A	0.0	0.0	0.9	0.1	0.4	2.7	27.4	52.9	15.8	100.2	66.54	2.18
Lake St. Clair													
161	A	0.0	0.0	0.0	0.0	0.2	0.6	5.9	66.6	26.5	99.8	68.34	1.78
162	A	0.0	0.0	0.9	0.2	0.7	5.9	12.7	48.3	31.3	100.0	65.62	2.62
163	A	0.0	0.0	0.0	0.0	0.4	3.5	7.4	61.3	27.3	99.9	67.56	1.79
164	A	0.0	0.0	0.0	0.0	0.2	1.2	2.6	74.5	21.4	99.9	68.14	1.62
165	A	0.0	0.0	0.0	0.0	1.7	25.7	46.9	16.1	9.6	100.0	72.19	1.13
166	A	0.0	0.0	1.5	0.5	0.5	2.7	6.0	45.8	43.3	100.3	58.34	2.76
167	A	0.0	0.0	1.8	0.9	1.5	2.3	5.0	57.3	31.1	99.9	61.03	3.13
168	A	0.0	0.0	0.0	0.0	0.1	0.4	17.9	46.2	35.5	100.1	69.67	1.45
169	A	0.0	0.0	0.2	0.0	0.5	24.5	46.5	20.0	8.6	100.3	71.73	2.51
170	A	0.0	0.0	0.0	0.0	0.4	0.9	9.2	72.4	17.1	100.0	45.12	5.67*
171	A	0.0	0.0	0.1	0.5	7.7	29.2	40.8	16.2	6.0	100.5	74.32	0.91
172	A	0.0	0.0	0.0	0.0	0.4	0.9	4.7	73.1	20.9	100.0	68.29	1.20
173	A	0.0	0.0	0.4	0.2	0.2	1.0	10.9	69.4	18.3	100.4	67.95	2.05
174	C	0.0	0.0	0.0	0.0	0.3	2.9	56.1	34.6	6.2	100.1	76.49	0.52
175	A	0.0	0.0	0.0	0.0	0.2	2.0	42.6	48.0	7.1	99.9	68.00	2.84

Appendix 5. *(Continued)*

Station number and jurisdiction		Sieve size 3/8	4	10	16	28	50	100	200	200 (passed)	Total %	Total solids	Volatile solids
176	A	0.0	0.0	0.0	0.4	1.5	3.1	4.0	10.8	80.0	99.8	64.52	2.88
177	C	0.0	0.0	0.2	0.7	3.7	3.3	4.0	31.9	56.3	100.1	57.20	3.56
178	C	0.0	0.0	0.0	0.0	0.5	20.0	53.5	17.1	8.6	99.7	77.05	0.69
179	C	0.0	0.0	0.0	0.0	0.4	7.0	55.3	29.7	7.4	99.8	74.44	0.59
180	C	0.0	0.0	0.0	0.0	0.2	0.9	39.5	47.8	11.2	99.6	64.10	2.31
181	A	0.0	0.0	0.2	0.1	2.3	3.6	7.6	37.0	49.2	100.0	65.59	2.36
182	A	0.0	0.0	0.4	0.8	2.9	5.1	6.0	28.8	56.2	100.2	53.50	4.21
183	C	0.0	0.0	0.0	0.2	1.6	4.1	5.8	36.1	51.8	99.6	56.69	3.42
184	C	0.0	0.0	0.6	0.3	1.7	6.2	10.0	57.6	23.7	100.1	66.48	2.04
185	C	0.0	0.0	0.0	0.0	0.7	30.2	52.6	13.2	3.1	99.8	76.85	0.55
186	C	0.0	0.0	0.0	0.3	1.2	35.0	48.9	11.5	2.9	99.8	72.91	1.07
187	A	0.0	0.0	0.0	0.2	0.3	0.5	40.2	48.3	10.8	100.3	55.42	2.54
188	A	0.0	0.6	2.8	2.4	9.9	17.7	33.5	23.8	8.8	99.5	83.99	1.23
189	C	0.0	0.0	0.8	1.7	1.5	3.5	11.7	45.3	35.5	100.0	47.04	4.34
190	C	0.0	0.0	0.4	1.0	1.6	4.8	15.0	47.0	30.6	100.4	40.54	6.21*
191	C	0.0	0.0	0.8	0.7	1.1	3.3	5.9	53.7	34.1	99.6	54.66	3.64
192	C	0.0	0.0	0.0	0.0	0.2	0.7	4.6	71.1	23.4	100.0	67.44	1.12
193	A	0.0	0.6	4.8	3.3	4.8	13.0	54.9	11.7	7.1	100.2	84.28	2.87
194	C	0.0	0.0	0.1	0.4	2.7	9.7	10.0	38.6	38.1	99.6	48.74	3.63
195	C	0.0	0.0	0.4	0.5	0.9	10.0	26.8	24.1	38.8	101.5	51.17	3.80
196	C	0.0	0.0	0.1	0.5	1.1	9.0	13.8	43.8	32.1	100.4	52.19	3.88
197	C	0.0	0.5	0.2	0.8	5.3	20.3	41.4	22.5	9.8	100.8	73.99	1.77
198	C	0.0	0.0	0.2	0.8	4.5	5.9	9.9	36.9	41.6	99.8	62.22	2.88
199	C	0.0	0.0	0.0	0.3	0.2	3.1	68.7	25.5	2.9	100.7	75.74	0.65
200	C	-	-	-	-	-	-	-	-	-	-	80.87	1.30
201	C	0.0	0.0	0.0	0.0	0.2	1.6	61.1	27.6	9.6	100.1	74.95	0.74
202	C	0.0	0.0	0.0	0.2	3.5	19.3	48.7	20.6	7.3	99.6	77.14	1.31
203	C	0.0	0.0	0.3	2.9	15.3	43.4	13.0	20.2	4.0	99.1	75.07	1.94
Detroit River													
204	A	0.0	0.0	0.2	0.6	1.0	2.4	9.0	52.4	34.8	100.4	43.57	5.48*
205	A	0.0	0.0	0.1	0.3	0.5	0.7	21.0	65.0	13.3	100.9	73.27	1.39
206	A	0.0	0.0	0.0	0.2	0.3	1.0	57.5	33.4	8.4	100.8	71.96	0.82
207	A	0.0	0.0	1.2	0.8	2.4	6.0	8.5	33.9	47.5	100.3	50.38	4.09
208	A	0.0	0.0	1.7	0.2	0.8	2.6	6.3	59.8	29.2	100.6	73.68	1.37
209	C	0.0	0.0	0.0	0.2	1.5	7.2	50.4	27.2	13.7	100.2	72.74	1.51
210	C	0.0	1.4	3.2	0.8	2.7	9.0	12.6	24.9	45.3	99.9	70.96	1.81
211	A	0.0	0.0	0.5	0.3	0.8	4.2	26.0	47.3	21.2	100.3	45.67	9.61*
212	C	0.0	0.0	0.4	1.9	11.9	20.1	26.0	30.9	9.6	100.8	71.07	13.45*
213	C	0.0	0.0	0.0	0.0	0.8	2.0	30.4	40.8	26.8	100.8	31.61	6.22*
214	C	0.0	0.0	0.9	0.7	3.9	7.6	12.4	56.8	17.2	99.5	50.38	4.87
215	C	0.0	0.0	0.0	0.2	0.7	4.6	45.4	37.4	12.5	100.8	72.63	2.45

Appendix 5. *(Continued)*

Station number and jurisdiction		3/8	Sieve size 4	10	16	28	50	100	200	200 (passed)	Total %	Total solids	Volatile solids
216	A	0.0	0.2	0.1	0.6	5.8	14.9	25.3	36.4	16.9	100.2	60.35	37.86*
217	C	0.0	0.0	0.4	0.8	0.4	1.2	9.2	47.2	39.6	98.8	42.67	5.47*
218	C	0.0	0.0	2.4	12.4	23.6	14.4	6.8	17.2	24.4	101.2	39.21	6.01*
219	C	0.0	0.0	3.4	6.8	9.4	14.2	39.8	16.0	9.8	99.4	68.49	2.16
220	A	0.0	0.4	4.4	3.4	14.2	10.4	19.2	18.2	28.4	98.6	58.65	5.61*
221	C	0.0	0.0	0.6	2.1	6.8	7.1	10.4	36.0	36.7	99.7	55.87	2.78
222	A	1.9	1.1	2.2	5.1	13.5	14.0	24.3	13.7	24.0	99.8	69.07	2.82
223	C	0.0	0.0	7.6	4.0	13.2	8.4	19.4	23.6	23.4	99.6	67.06	3.15
224	A	0.0	0.3	0.7	1.5	9.3	12.5	32.7	24.7	18.5	100.2	55.69	4.20
225	C	0.0	1.4	2.7	1.1	8.1	24.1	44.4	11.0	7.2	100.0	75.54	1.12
226	A	0.0	1.8	1.4	2.2	16.2	16.6	11.4	8.0	41.2	98.8	63.20	3.66
227	C	0.0	0.6	4.4	8.2	25.0	16.8	13.0	12.8	18.6	99.4	46.98	4.12
228	A	0.0	0.0	0.4	2.0	11.2	12.4	12.6	21.2	39.0	98.8	47.97	6.03*
229	C	5.1	0.0	0.4	0.2	5.8	6.2	28.3	36.7	16.6	99.3	69.26	1.69
230	A	0.0	0.0	0.0	0.0	8.8	20.0	16.4	13.6	39.2	98.0	21.76	11.19*
231	A	0.0	0.0	0.0	0.2	5.8	9.8	23.8	37.0	22.0	98.6	60.59	2.83
232	C	0.0	1.2	2.5	1.0	5.7	14.1	44.6	19.3	11.2	99.6	71.20	2.06
233	A	0.0	0.0	0.4	0.2	1.8	3.4	13.0	57.6	22.8	99.2	64.34	6.61*
234	A	0.0	1.6	1.0	0.4	9.4	9.0	18.2	28.8	30.2	98.6	50.48	7.27*
235	A	0.0	0.0	0.1	0.1	2.2	10.6	41.2	31.5	14.2	99.9	76.90	2.23
236	A	0.0	0.9	4.8	6.5	19.3	16.8	16.8	29.9	4.3	99.3	55.15	11.44*
237	A	0.0	0.0	0.0	0.1	2.5	15.0	29.0	36.2	17.4	100.2	70.56	1.57
238	C	0.0	0.0	0.0	0.3	0.3	3.3	15.0	26.7	52.3	97.9	26.42	9.78*
239	A	0.0	0.0	0.3	0.1	3.7	17.4	37.3	27.5	13.5	99.8	67.42	2.70
240	A	0.0	0.0	9.5	3.4	5.0	5.9	12.1	50.1	14.0	100.0	44.47	5.43*
241	A	0.0	0.0	0.7	0.3	3.2	10.5	15.9	22.1	46.9	99.6	50.31	5.75*
242	A	0.0	0.0	0.3	0.0	0.3	3.3	31.0	50.1	15.2	100.2	70.99	2.22
243	A	0.0	0.0	0.5	0.2	2.9	12.8	6.9	19.2	58.0	100.5	44.83	5.53*
244	C	0.0	0.0	0.1	0.0	1.8	17.1	23.2	37.7	20.1	100.0	70.04	1.98
245	A	0.0	0.0	0.1	0.0	0.1	1.6	37.3	54.2	6.6	99.9	71.17	1.58
246	A	0.0	0.0	0.0	0.6	2.2	3.6	7.0	27.6	58.8	99.8	47.17	4.45
247	C	0.0	0.0	0.0	0.2	2.6	15.2	10.6	22.4	48.4	99.4	41.13	5.56*
248	A	0.0	0.0	0.0	0.1	0.1	0.8	4.3	75.3	19.0	99.6	66.89	2.33
249	A	0.0	0.0	0.6	0.1	1.2	16.2	21.8	26.0	34.0	99.9	63.56	2.42
250	C	0.0	0.0	0.4	0.3	5.7	19.6	11.9	20.3	41.6	99.8	40.33	5.24*

TECHNICAL REPORT DATA

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Project was performed as part of the binational Upper Great Lakes Connecting Channels Study

16. ABSTRACT

Contamination of sediments by toxic organic substances and heavy metals was widespread throughout the connecting channels of the upper Great Lakes in 1985. Sediments at 250 stations in the connecting channels were analyzed for total PCBs, oil and grease, phenols, total cyanide, total volatile solids, mercury, cadmium, chromium, cobalt, copper, lead, nickel and zinc, and the results were evaluated according to U.S. Environmental Protection Agency (USEPA) guidelines for polluted sediments. Guidelines for Cd, Hg, and PCBs by the Ontario Ministry of the Environment, which are more restrictive than USEPA guidelines, are also referenced. The percentage of stations that were contaminated according to USEPA guidelines by at least one of the studied substances was St. Marys River - 92%, St. Clair River - 66%, Lake St. Clair - 65%, and the Detroit River - 81%. Sediments were most heavily contaminated near industrialized areas, although some areas more than 40 km downstream from known point sources of pollution were moderately contaminated by oil and metals.

17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTIONS	b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field Group
Great Lakes, St. Marys River, St. Clair River, Lake St. Clair, Detroit River, sediments, contamination, pollution, PCB, oil, grease, phenol, cyanide, mercury, cadmium, chromium, cobalt, copper, lead, nickel, zinc		

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