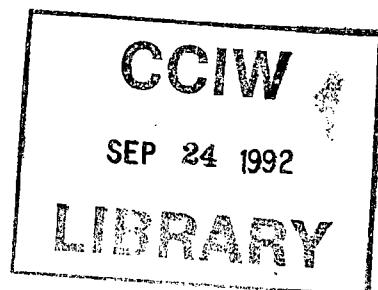


Cdn. Wildlife Ser.
Tech. Rpt. Series
#152

**AN ATLAS OF CONTAMINANTS IN EGGS OF
FISH-EATING COLONIAL BIRDS OF THE GREAT LAKES
(1970-1988)**

**VOLUME I
ACCOUNTS BY SPECIES AND LOCATIONS**

Christine A. Bishop
D.V. (Chip) Weseloh
Neil M. Burgess
John Struger
Ross J. Norstrom
Richard Turle
Karen A. Logan



TECHNICAL REPORT SERIES No.152
Ontario Region 1992
Canadian Wildlife Service



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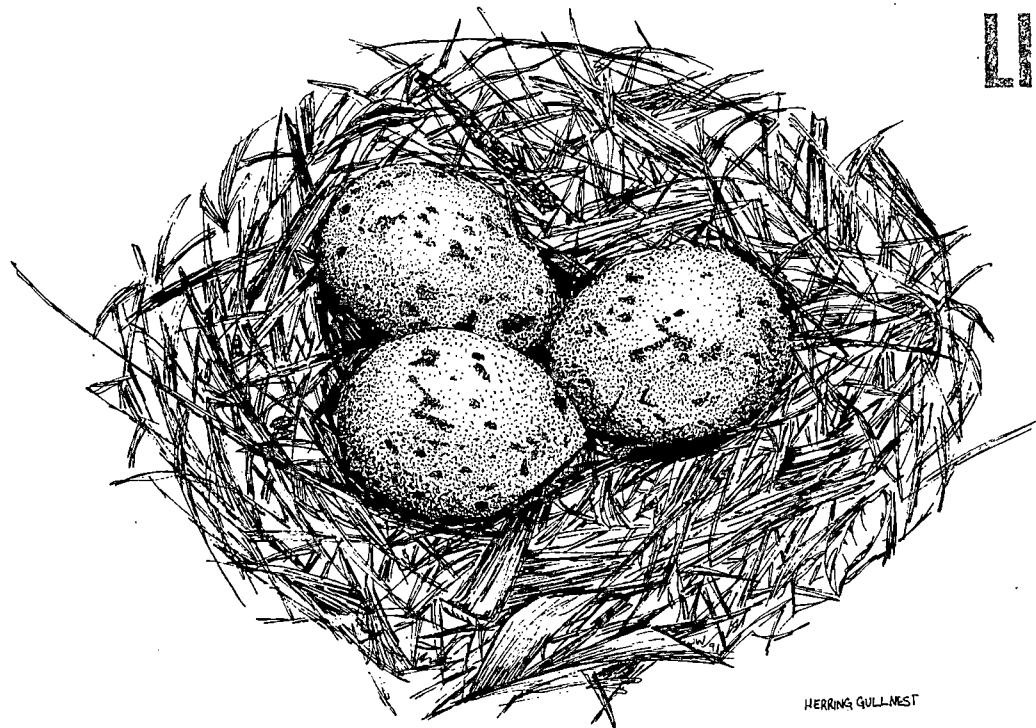
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FISH-EATING COLONIAL BIRDS OF THE GREAT LAKES
(1970-1988)
VOLUME I
ACCOUNTS BY LOCATIONS AND SPECIES**

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This report may be cited as: Bishop, C.A., D.V. Weseloh, N.M. Burgess, J. Struger, R.J. Norstrom, R.Turle, K.A. Logan. 1992. An atlas of contaminants in eggs of fish-eating colonial birds of the Great Lakes (1970-1988) Vol. I. Technical Report Series No. 152, Canadian Wildlife Service, Ontario Region.

Published by Authority of the
Minister of Environment
Canadian Wildlife Service

© Minister of Supply and Services Canada 1992
Catalogue No. CW 69-5/152E
ISBN No. 0-662-19622-8
ISSN 0831-6481

Copies may be obtained from:
Canadian Wildlife Service
867 Lakeshore Road
Box 5050
Burlington Ontario L7R 4A6
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RÉSUMÉ

Les Grands Lacs canadiens et américains ont été un lieu important de recherches et d'études sur la pollution et ses effets. Il existe aujourd'hui une somme énorme de données sur les niveaux de pollution dans les eaux, les sédiments et de nombreux niveaux trophiques des Grands Lacs. Toutefois, les scientifiques et le public éprouvent souvent de la difficulté à obtenir un résumé complet des données concernant la contamination à un ou plusieurs niveaux trophiques. Dans cet atlas, sont résumés les concentrations moyennes de trente-neuf contaminants ainsi que les pourcentages de lipides mesurés par le Service canadien de la faune, de 1970 à 1988, dans les oeufs de sept espèces d'oiseaux coloniaux piscivores de toutes les parties des Grands Lacs. L'atlas, qui contient 4 491 données, ne recense pas les données qui ont été recueillies par d'autres organismes.

Au début des années 70, une diminution des populations de plusieurs espèces d'oiseaux nicheurs piscivores a été constatée dans une grande partie des Grands Lacs (Gilbertson, 1975; Vermeer et Peakall, 1977 a et b; Postupalsky, 1978; Price et Weseloh, 1986; Weseloh et al., 1986). Dans le cas des espèces comme le Cormoran à aigrettes (*Phalacrocorax auritus*) dont les effectifs étaient relativement faibles par rapport aux goélands, la diminution était très évidente. Devant la baisse de productivité ou des effectifs de ces oiseaux, le Service canadien de la faune entreprit une étude sur les concentrations de contaminants dans les populations d'oiseaux piscivores des Grands Lacs et sur leurs effets biologiques possibles. Ces oiseaux, particulièrement les populations du lac Ontario, étaient parmi les plus fortement contaminés au Canada et au monde par diverses substances chimiques (Vermeer et Peakall, 1977).

Durant la deuxième moitié des années 70, suite à l'adoption de mesures restreignant l'utilisation et l'élimination de nombreux produits chimiques toxiques, les concentrations des contaminants ont commencé à baisser dans les oeufs d'oiseaux piscivores (Gilman et al., 1977; Weseloh et al., 1979). La plupart des populations de ces oiseaux ont conséquemment montré des signes de rétablissement (Price et Weseloh, 1986; Cadman et al., 1987).

Cet atlas réunit les données sur les concentrations de contaminants qui ont été mesurées dans les oeufs des oiseaux piscivores de 1970 à 1988. Il permet de localiser les données se rapportant à des lieux précis d'échantillonnage ou à des contaminants particuliers en procédant par étapes. Il est destiné à fournir rapidement et facilement réponse à diverses questions concernant, par exemple, les endroits où des oeufs ont été prélevés pour analyse, les données disponibles sur les concentrations de contaminants particuliers dans les oeufs d'oiseaux aquatiques coloniaux, les tendances spatiales et géographiques des concentrations des contaminants dans ces oeufs et l'alimentation de ces oiseaux dans la région des Grands Lacs.

Dans le volume I, l'information sur les concentrations des contaminants est résumée de trois façons différentes. Premièrement, l'information est présentée selon le lieu d'échantillonnage. Deuxièmement, les tendances des concentrations de quatre contaminants importants (*p,p'*-DDE, dieldrine, biphenyles polychlorés et 2,3,7,8-tétrachlorodibenzo-p-dioxine) dans les oeufs du Goéland argenté sont présentées sous une forme graphique. Troisièmement, les tendances des populations de chaque espèce ainsi que les tendances géographiques et temporelles des concentrations des contaminants dans les oeufs de chacune sont montrées. Afin de faciliter l'interprétation des données sur les contaminants, on a également inclus dans ce volume un résumé des aliments qu'utilisent les oiseaux de chaque espèce dans la région des Grands Lacs.

Dans le volume II, les données sont résumées uniquement suivant le type de contaminant mesuré dans les oeufs.

ACKNOWLEDGEMENTS

We would like to acknowledge the following people who have enthusiastically, and diligently contributed to the study of contaminants in colonial waterbird eggs during 1970-1988. Michael Gilbertson, Andrew Gilman, Glen Fox, Pierre Mineau, Stanley Teeple, Douglas Hallett, Earl Walker, Martin McNicholl, Hans Blokpoel, Gaston Tessier, Ralph Morris, Jim Brown, Earl Walker, Larry Benner, Jim Brown, Jim Ludwig, Greg Smith, Lauri Maus, Ann Harfenist, Sergei Postupalsky, Gary Shugart, Tim Kubiak, Ken Stromberg, John Ryder, Tim Carroll, Rob Dobos, Vicky Johnston, Jeanette Bider, Rhonda Markel, John Chardine, Robert Hoffman, Denis Case, Jeff Robinson, Peter Ross, Peter Ewins, Margie Koster, Karen Pettit, and Brian McHattie collected eggs or assisted with this project.

Access to nesting colonies was graciously provided by: Jim Day, Phillips Petroleum Company, Presquile Provincial Park, Metropolitan Toronto Parks and Recreation, Metro Toronto Region Conservation Authority, Hamilton Harbour Commission, Ontario Hydro, Niagara Parks Commission, Dept. of Transport, Canadian Wildlife Service, Long Point Company, Canada Furnace Company, Cruse Moss, Ontario Ministry of Natural Resources, BASF Corporation, Walpole Island Native Band, and the U.S. Army Corps of Engineers.

Useful comments on draft manuscript(s) of the atlas were provided by W. Keith Marshall, John Elliott, and Glen Fox. Alvaro Jaramillo and Rod McCaw assisted in the proof-reading of the entire data set of the atlas.

We also acknowledge support from the Great Lakes Action Plan. The project would not have been completed without funding from the Preservation Program. In addition, Environment Canada's Great Lakes Cleanup Fund provided funds to print this report.

Many people have contributed to this work over the past eighteen years. We hope we have not forgotten anyone, but undoubtedly some volunteer(s) who came out for a day or a few hours to help may have been omitted. Our apologies. Here's to flat water forever!

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INTRODUCTION

The Great Lakes of Canada and the United States have been a major arena for research and monitoring studies of pollution levels and effects. Today, there is an enormous database on the pollution levels in water, sediment and many trophic levels of the Great Lakes. However, it is often difficult for scientists and the public to easily locate a comprehensive summary of data concerning contamination in any or all of these trophic levels. This atlas provides a summary of the mean concentrations of thirty-nine contaminants and the percent lipid measured in eggs of seven species of fish-eating colonial birds sampled only by the Canadian Wildlife Service throughout the Great Lakes during 1970-1988. There are 4491 data points presented in the atlas; however, this does not include any contaminant data concerning biota in the Great Lakes collected by other organizations and agencies.

Throughout much of the Great Lakes, the population levels of several species of breeding fish-eating birds declined during the early 1970s (Gilbertson, 1975; Vermeer and Peakall, 1977a,b; Postupalsky, 1978; Price and Weseloh, 1986; Weseloh et al., 1986). For species such as, the Double-crested Cormorant (Phalacrocorax auritus), whose numbers were low relative to gulls, population declines were extremely conspicuous. In response to lowered productivity and/or declining population levels, the Canadian Wildlife Service began a study of the contaminant levels in Great Lakes populations of fish-eating birds, and their possible biological effects. These species were among the most heavily contaminated by various toxic chemicals in Canada and the world, especially populations located in Lake Ontario (Vermeer and Peakall, 1977).

With the advent of legislative controls and restrictions on the use and disposal of many toxic chemicals, chemical concentrations found in eggs of fish-eating birds began to decline after the mid-1970s (Gilman et al., 1977; Weseloh et al., 1979). Accordingly, most of the fish-eating bird populations have shown signs of recovery (Price and Weseloh, 1986; Cadman et. al., 1987).

We present the levels of contaminants found in eggs of fish-eating birds throughout 1970-1988. Data from specific sampling locations or specific contaminants can be retrieved in a stepwise manner from this atlas. The purpose of the atlas is to provide a quick and easy answer to questions such as where have eggs been collected for analysis; how much data is available on levels of specific contaminants in eggs of colonial waterbirds; what are the spatial and geographic trends in contaminant levels in these bird eggs; and finally, what is the diet of colonial waterbirds in the Great Lakes?

In Volume I, information on contaminant levels is summarized in three different manners. Firstly, it is presented on the basis of sample locations. Secondly, trends in levels of four major contaminants: p,p'-DDE, dieldrin, polychlorinated biphenyls and 2,3,7,8-tetrachlorodibenzo-p-dioxin in Herring Gull eggs are presented in graphic form. Thirdly, population trends of each species, and geographic, and temporal trends in contaminant levels in the eggs of each species are given. Also in Volume I, a summary of the diets of each species in the Great Lakes is provided as an aid for interpretation of the contaminant data.

In Volume II, data is summarized only on the basis of the types of contaminants measured in eggs.

INSTRUCTIONS FOR USERS OF THIS ATLAS

The contaminant data contained in this Atlas (Volumes I and II) is presented in four forms:

1. Mean concentrations of contaminants, summarized by location (Volume I, Section 1).
2. Mean concentrations of contaminants, summarized by compound (Volume II, Section 1).
3. Trends in four contaminants in Herring Gull eggs from Great Lakes annual monitor colonies (Volume I, Section 2).
4. Discussion of population trends, and temporal and geographic variation in contaminant levels for seven species on the Great Lakes (Volume I, Section 3).

Also, the results of diet studies, primarily on the Great Lakes, for each species for which eggs have been collected for contaminant analysis are summarized (Volume I, Section 4).

This atlas has been designed to be used in a stepwise manner. The quickest method of finding the data available for a specific location or a specific chemical is described below.

1) This first step is designed to alert the user to the scope of the database in the document. Tables 1-10 are summaries of species sampled, compounds analyzed and number of eggs analyzed in each sample year (1970-1988) from colonies on the Great Lakes. The accompanying maps (Figures 1-10) illustrate the locations of Great Lakes colonies of fish-eating birds from which eggs were collected for contaminant analysis. The colony names are numbered on the maps and these correspond to the numbers on the accompanying tables. These tables are present in both Volume I and Volume II.

For example, if you are interested in types of contaminants and the levels found in the eggs of fish-eating birds in the Kingston area, you would refer to Figure 2 (p.20), which illustrates the colonies sampled in Eastern Lake Ontario. The colonies: Snake Island, West Brothers Island, Pigeon Island, and Little Galloo Island are located near Kingston. You would then refer to Table 2, which lists the species whose eggs were sampled at each

of these colonies, the years of sampling and the contaminants measured in the eggs. This simply and quickly informs you how much data is available for species in every area of the Great Lakes.

2) The second step, is to locate the mean, standard deviation and sample size for each contaminant measurement in the eggs of every species that has been sampled in the location of interest. Volume I, Section 1 and Volume II, Section 1, contain summaries of the same data but present the data in two different ways. In Section 1, (Table 11), Volume I, the contaminant data is presented by sampling location and in Section 1 (Table 11) Volume II, the contaminant data is presented by types of chemicals measured in the eggs.

For example, if you are interested in data concerning species on Snake Island, refer to the data summary by sample location (Table 11, Volume I). If you are interested in data throughout the Great Lakes or in only a few colonies near Kingston concerning the chemical Dieldrin, then reference to the data summary by chemical analyzed in eggs (Table 11, Volume II), would be most suitable.

Data summary by Location Sampled (Volume I, Section 1).

An index lists the lakes and colonies sampled throughout the Great Lakes (p.1-2). It lists the page numbers in Table 11 on which all contaminant data can be found concerning each species at each colony.

Following the index, Table 11 presents contaminant data for eggs of fish-eating birds summarized by lakes, colonies and years sampled.

Data summary by Chemical Analyzed in Eggs (Volume II, Section 1).

An index lists the page numbers in Table 11 on which the data for each contaminant can be found for the colonies sampled in each lake.

Following the index, Table 11 presents contaminant data for eggs of fish-eating birds summarized by the chemical measured in the eggs for all lakes, colonies, species and years sampled.

For example, if you are interested in data concerning species on Snake Island he would refer to the data summary by location sampled (Table 11, Volume I). If you were interested in data throughout the Great Lakes or in only a few colonies for the chemical Dieldrin then reference to the data summary by chemical analyzed in eggs (Table 11, Volume II), would be most suitable.

It is important that the summary of methodologies and statistical notes pertaining to the contaminant data (p.38) is examined by all readers to facilitate proper interpretation of the data.

The locations, chemicals analyzed, and species are listed in the following order in all indices and tables:

1. The Lakes and colony locations are listed, generally, in east to west order.
2. The contaminants measured are listed, generally, in alphabetical order. A list of the order of the contaminants measured and the abbreviations used on the tables is supplied (p.16).
3. The species sampled are listed in the following order:

Herring Gull (Larus argentatus)
Double-crested Cormorant (Phalacrocorax auritus)
Caspian Tern (Sterna caspia)
Common Tern (Sterna hirundo)
Black-crowned Night Heron (Nycticorax nycticorax)
Ring-billed Gull (Larus delawarensis)
Forster's Tern (Sterna forsteri)

This list is arranged in sequential order which reflects the species for which we have the most (Herring Gull) to least data. Section 2 (Volume I). Additional graphic presentations of data are available in the Atlas in the form of:

Trends in contaminants (p,p'-dde, dieldrin, polychlorinated biphenyl 1254:1260, 2,3,7,8-tetrachlorodibenzo-p-dioxin) in Herring Gull eggs (Figures 11-24, Volume I). Histograms illustrate trends in these four contaminants in Herring Gull eggs from 1971 to 1988 for at least two colonies per lake.

Species Accounts (Section 3, Volume I).

These accounts discuss the population trends for each species, and the general spatial and temporal trends in major contaminant levels in the eggs of each species sampled during 1970-1988 (Tables 12-18, Volume I).

Diets of Selected Fish-eating Birds (Section 4, Volume I).

The results of diet studies, primarily on the Great Lakes, for each species for which eggs have been collected for contaminant analysis are summarized in tabular form (Table 19).

COMPOUNDS ANALYZED IN EGGS OF FISH-EATING BIRDS OF THE GREAT LAKES

The following compounds are listed in alphabetical order except for "percent lipid in egg". The underlined sections of the chemical names are the words which were used to place the chemical in its alphabetical position in the list. Chemical congeners are listed in order of increasing chlorination. The order of names in this list is consistently used throughout the tables in this document. Abbreviations correspond to those on Table 1 through Table 10.

CAS #	COMPOUNDS	ABBREVIATION
	Percent lipid in egg	% Lip
7440-38-2	Arsenic	As
7440-43-9	Cadmium	Cd
5103-71-9	<u>alpha</u> (<i>cis</i>)-chlordane	a-chl
5103-74-2	<u>gamma</u> (<i>trans</i>)- chlordan	g-chl
7304-13-8	<u>oxy</u> -chlordane	o-chl
87-61-6	1,2,3-chlorobenzene	123-CB
120-82-1	1,2,4-chlorobenzene	124 CB
180-70-3	1,3,5-chlorobenzene	135-CB
634-66-2	1,2,3,4-chlorobenzene 1,2,3,5-/1,2,4,5-chlorobenzene	1234-CB 1235/1245CB
608-93-5	penta-chlorobenzene	PecB
118-74-1	hexachlorobenzene	HCB
72-54-8	DDD	DDD
72-55-9	DDE	DDE
50-29-3	DDT	DDT
60-57-1	Dieldrin	Diel
1746-01-6	2,3,7,8-tetrachlorodibenzo-p-dioxin	Dioxin
40321-76-4	1,2,3,7,8-pentachlorodibenzo-p-dioxin	Dioxin
39227-28-6	1,2,3,6,7,8-hexachlorodibenzo-p-dioxin	Dioxin
35822-46-9	1,2,3,4,6,7,8-heptachlorodibenzo-p-dioxin	Dioxin
3268-87-7	octachlorodibenzo-p-dioxin	Dioxin
51207-31-9	2,3,7,8-tetrachlorodibenzofuran	Furan
57117-31-4	2,3,4,7,8-pentachlorodibenzofuran 1,2,3,4,7,8-/1,2,3,4,6,7-hexachlorodibenzofuran	Furan Furan
55684-94-1	1,2,3,6,7,8-hexachlorodibenzofuran	Furan
1024-57-3	Heptachlor epoxide	Hep Epx
39-84-6	<u>alpha</u> -hexachlorocyclohexane	a-hch
39-85-7	<u>beta</u> -hexachlorocyclohexane	b-hch
58-89-8	<u>gamma</u> -hexachlorocyclohexane	g-hch
7439-92-1	Lead	Pb
7439-97-6	Total mercury	Hg
2385-85-5	Mirex	Mir
39801-14-4	photomirex	P Mir
5103-73-1	<i>cis</i> -nonachlor	c-non
39765-80-5	<i>trans</i> -nonachlor Octachlorostyrene	t-non OCS
11097-69-1	PCB-1260	PCB 1260
11096-82-5	PCB-1254:1260	PCB 1254:1260
7782-49-2	Selenium	Se

LIST OF ABBREVIATIONS SPECIFIC TO Tables 1-10

Col no.	colony number
Spec.	species
yr	year of egg collection
HERG	Herring Gull
DCCO	Double-crested Cormorant
CATE	Caspian Tern
COTE	Common Tern
BCNH	Black-crowned Night-Heron
RBGU	Ring-billed Gull
FOTE	Forster's Tern

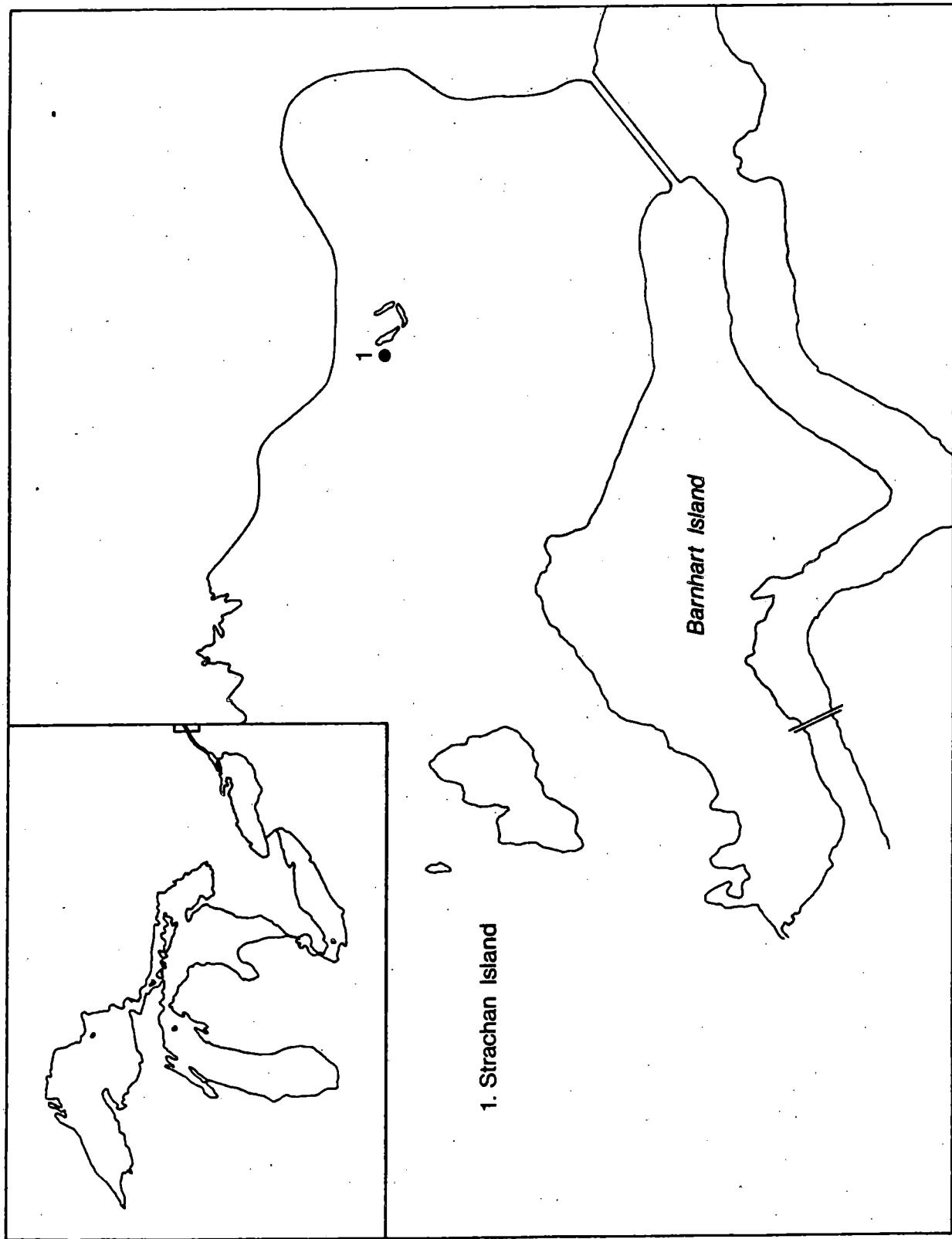


Figure 1. St. Lawrence River colonies of fish-eating birds from which eggs were collected for contaminant analysis.

Table 1. The sample size of eggs analyzed in each year (1970–1989) from the St. Lawrence River, arranged by collection site, species sampled, and compound analyzed.

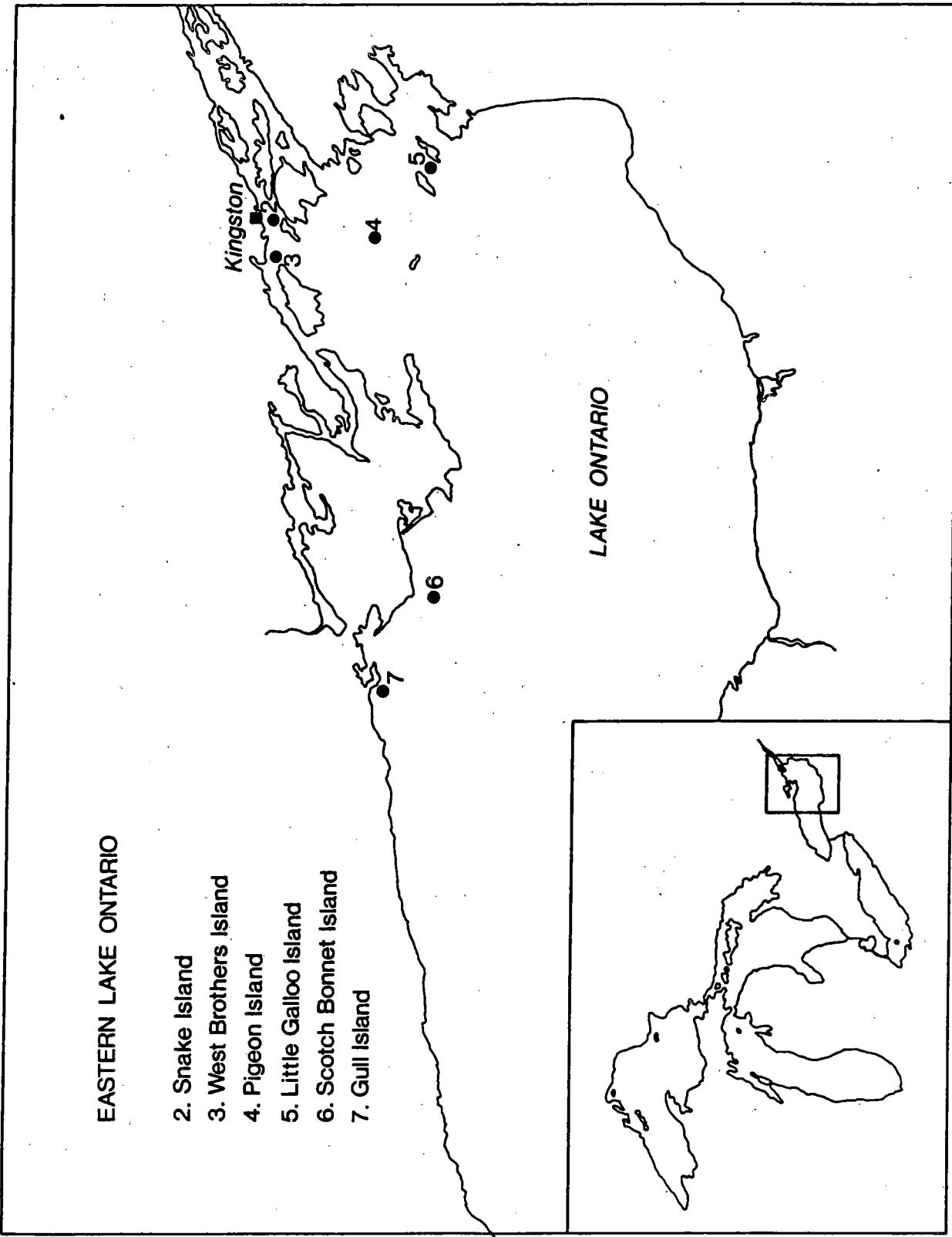


Figure 2. Eastern Lake Ontario colonies of fish-eating birds from which eggs were collected for contaminant analysis.

Table 2. The sample size of eggs analyzed in each year (1970-1989) from Eastern Lake Ontario, arranged by collection site, species sampled and compound analyzed.

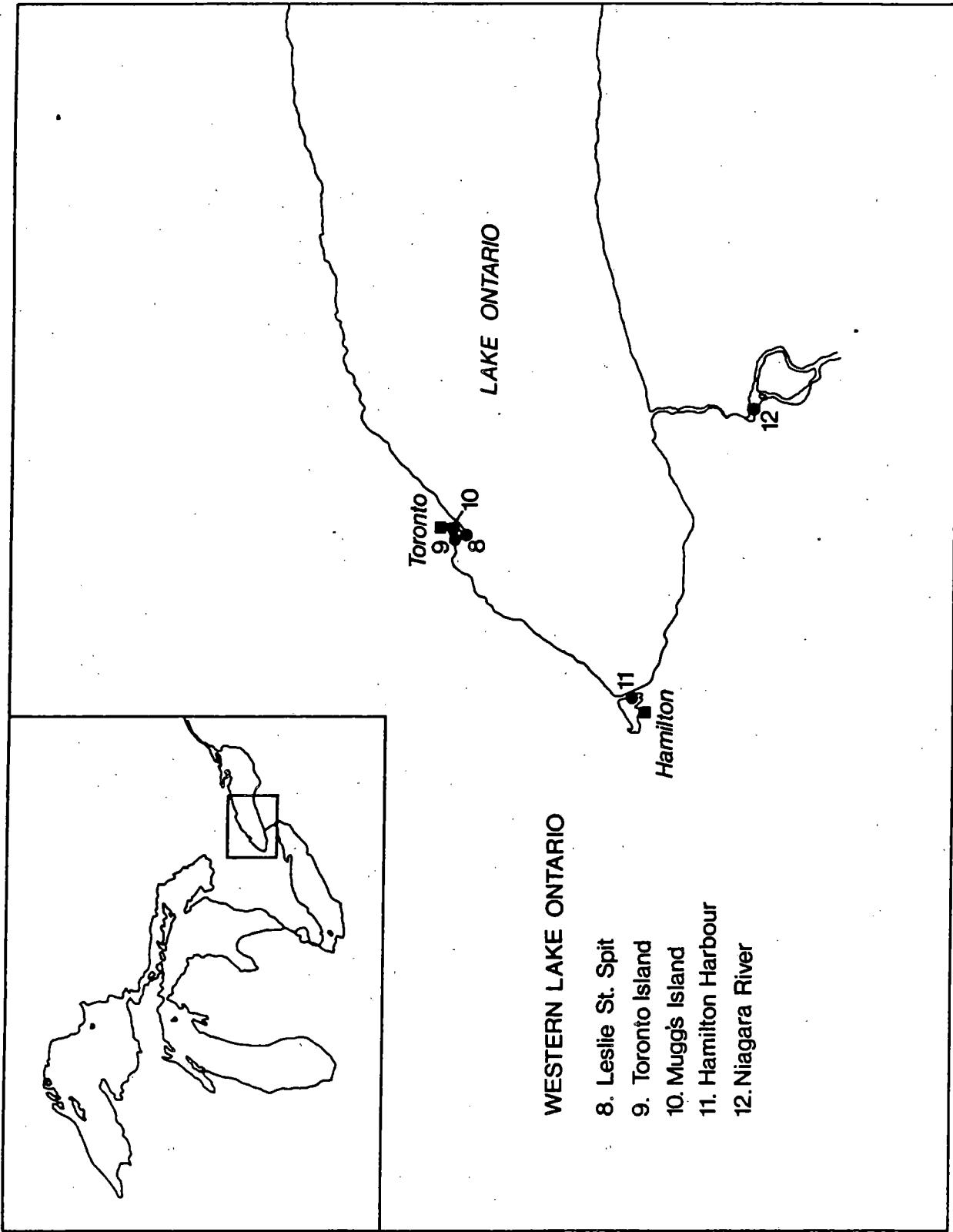


Figure 3. Western Lake Ontario and Niagara River colonies of fish-eating birds from which eggs were collected for contaminant analysis.

Table 3. The sample size of eggs analyzed in each year (1970–1982) from Western Lake Ontario and the Niagara River arranged by collection site, species sampled and compound analyzed.

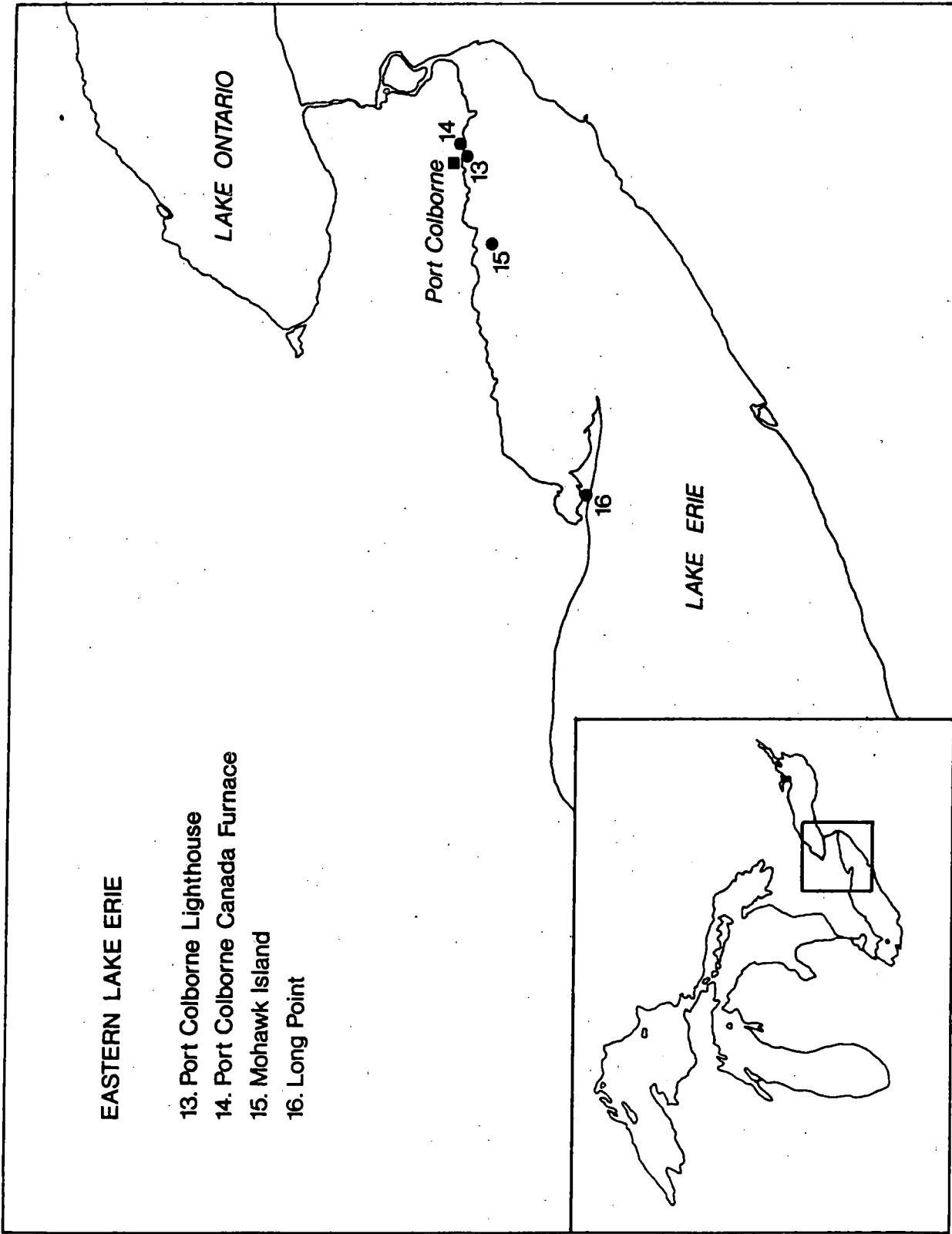


Figure 4. Eastern Lake Erie colonies of fish-eating birds from which eggs were collected for contaminant analysis.

Table 4. The sample size of eggs analyzed in each year (1970–1988) from Eastern Lake Erie arranged by collection site, species sampled and compound analyzed.

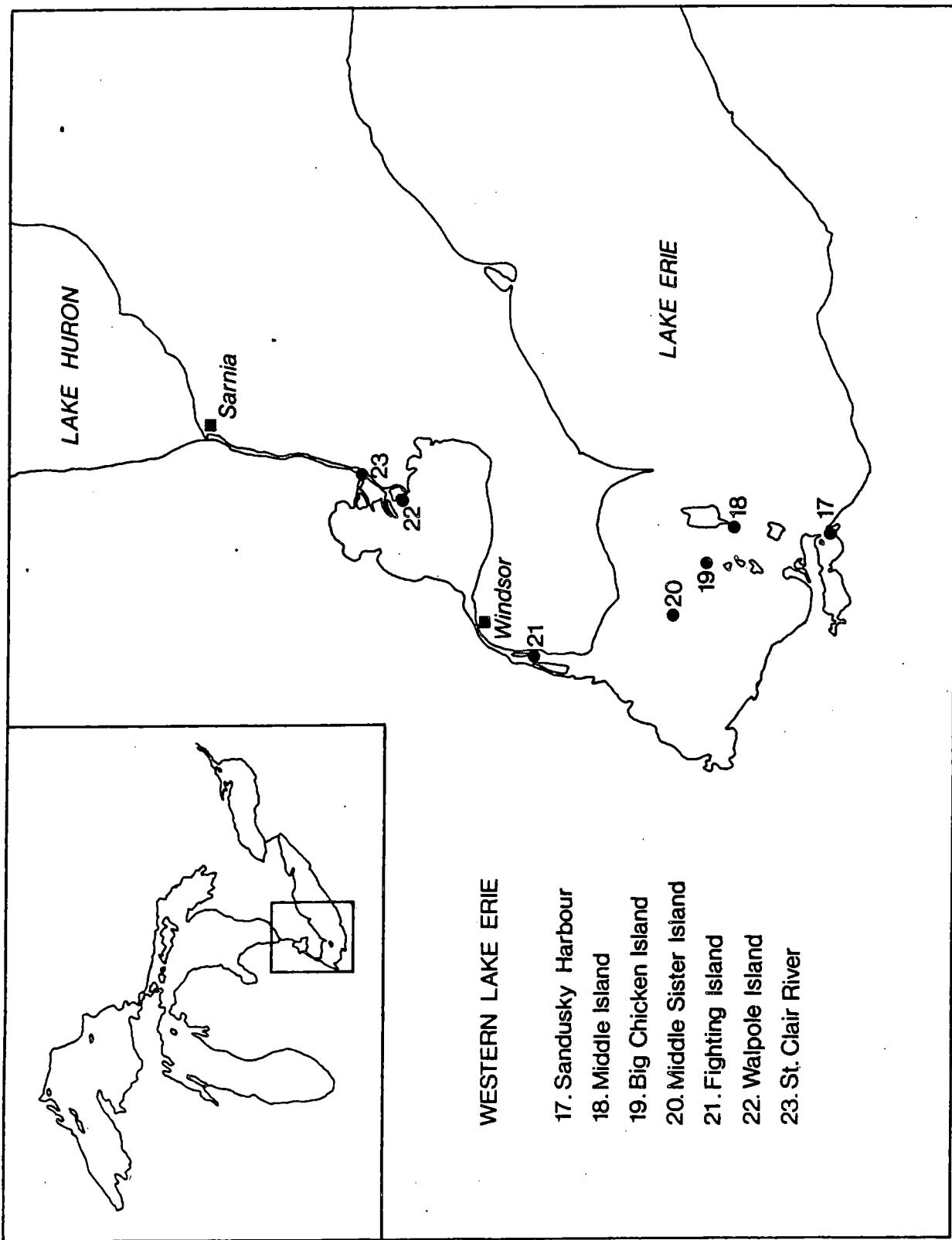


Figure 5. Western Lake Erie, Lake St. Clair and Detroit River colonies of fish-eating birds from which eggs were collected for contaminant analysis.

Table 5. The sample size of eggs analyzed in each year (1970-1988) from Western Lake Erie, Lake St. Clair and the Detroit River arranged by collection site, species sampled, and compound analyzed.

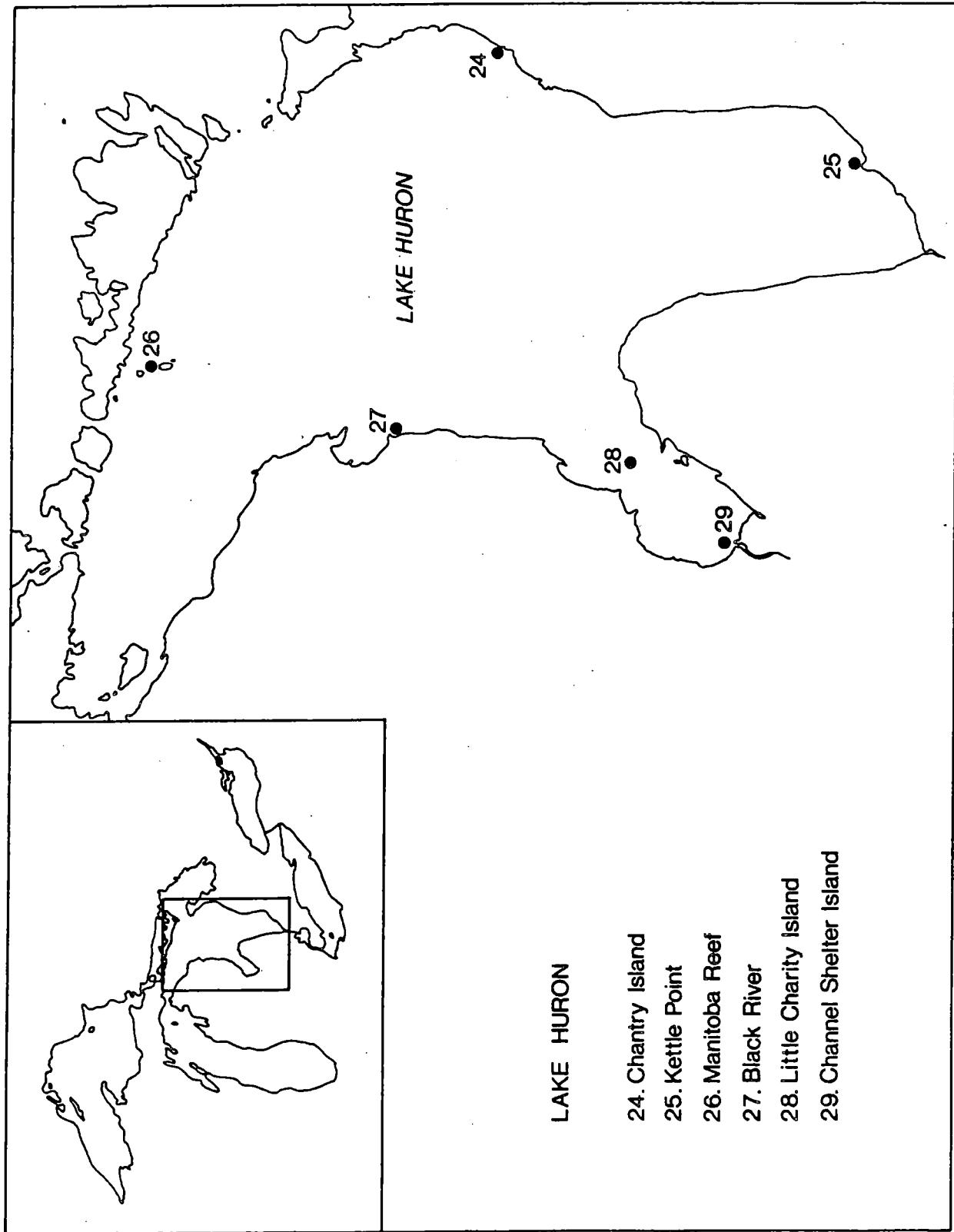


Figure 6. Lake Huron colonies of fish-eating birds from which eggs were collected for contaminant analysis.

Table 6. The sample size of eggs analyzed in each year (1970–1988) from Lake Huron arranged by collection site, species sampled, and compound analyzed.

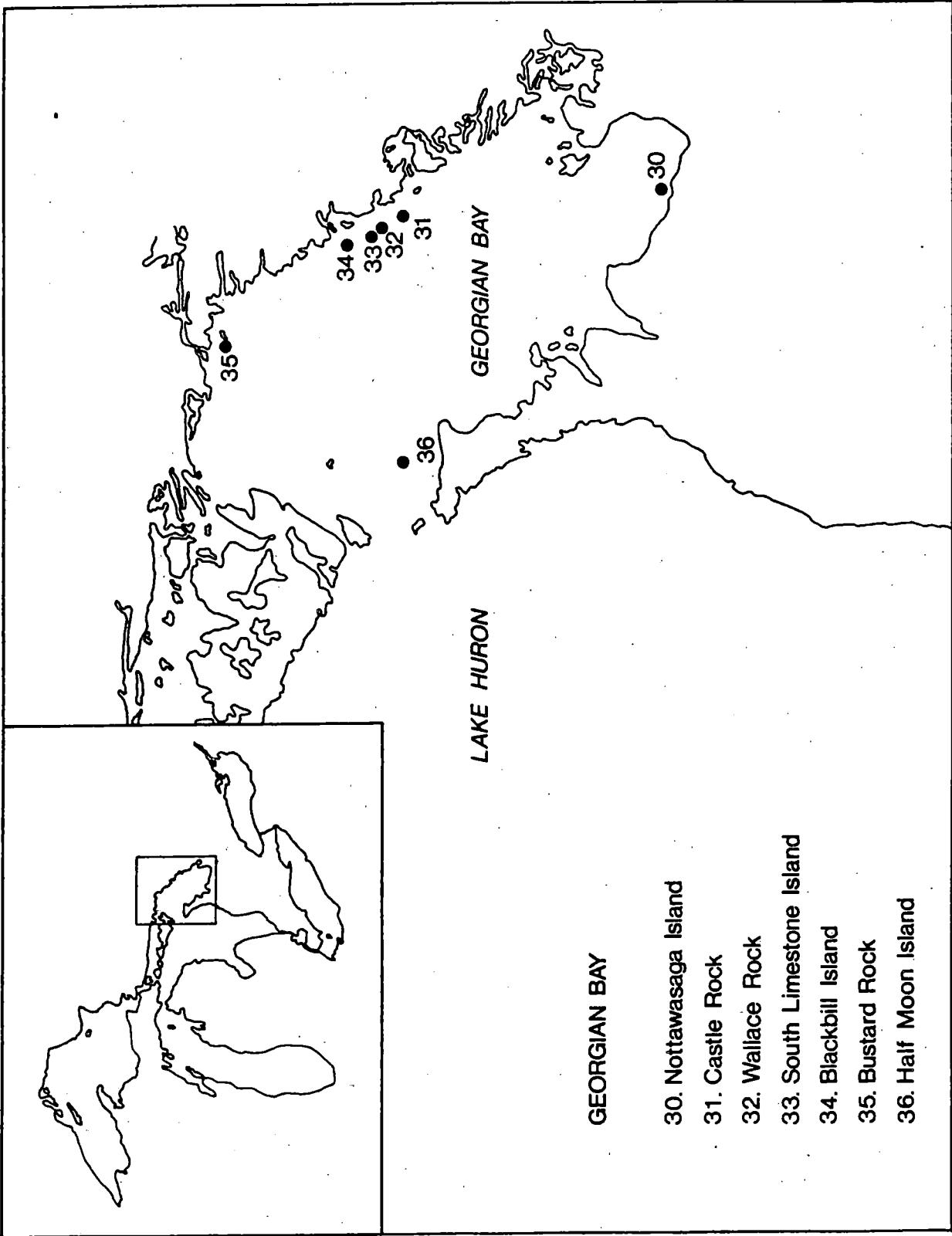


Figure 7. Georgian Bay colonies of fish-eating birds from which eggs were collected for contaminant analysis.

Table 7. The sample size of eggs analyzed in each year (1970–1989) from Georgian Bay arranged by collection site, species sampled, and compound analyzed.

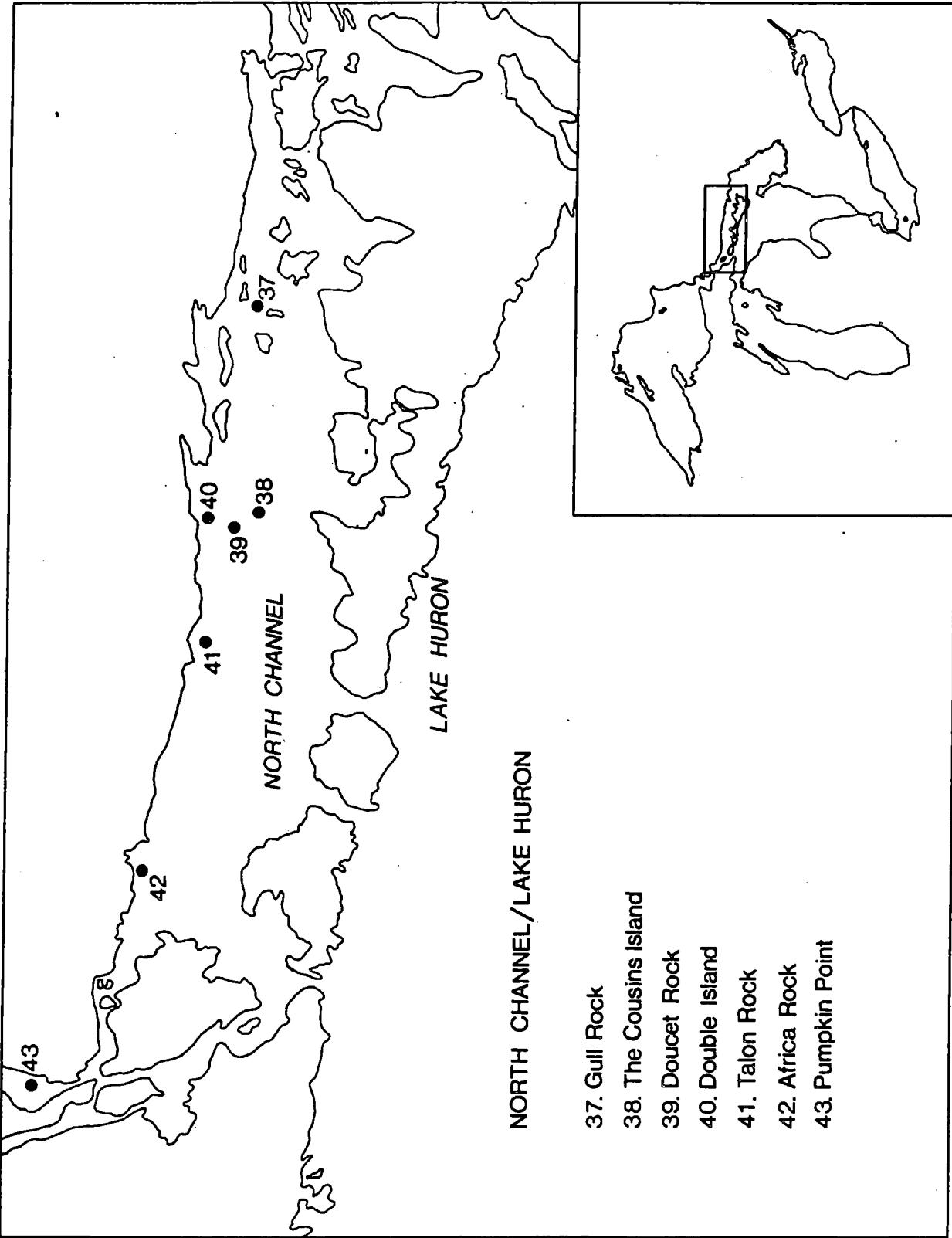


Figure 8. North Channel, Lake Huron colonies of fish-eating birds from which eggs were collected for contaminant analysis.

Table 8. The sample size of eggs analyzed in each year (1970–1988) from North Channel, Lake Huron arranged by collection site, species sampled, and compound analyzed.

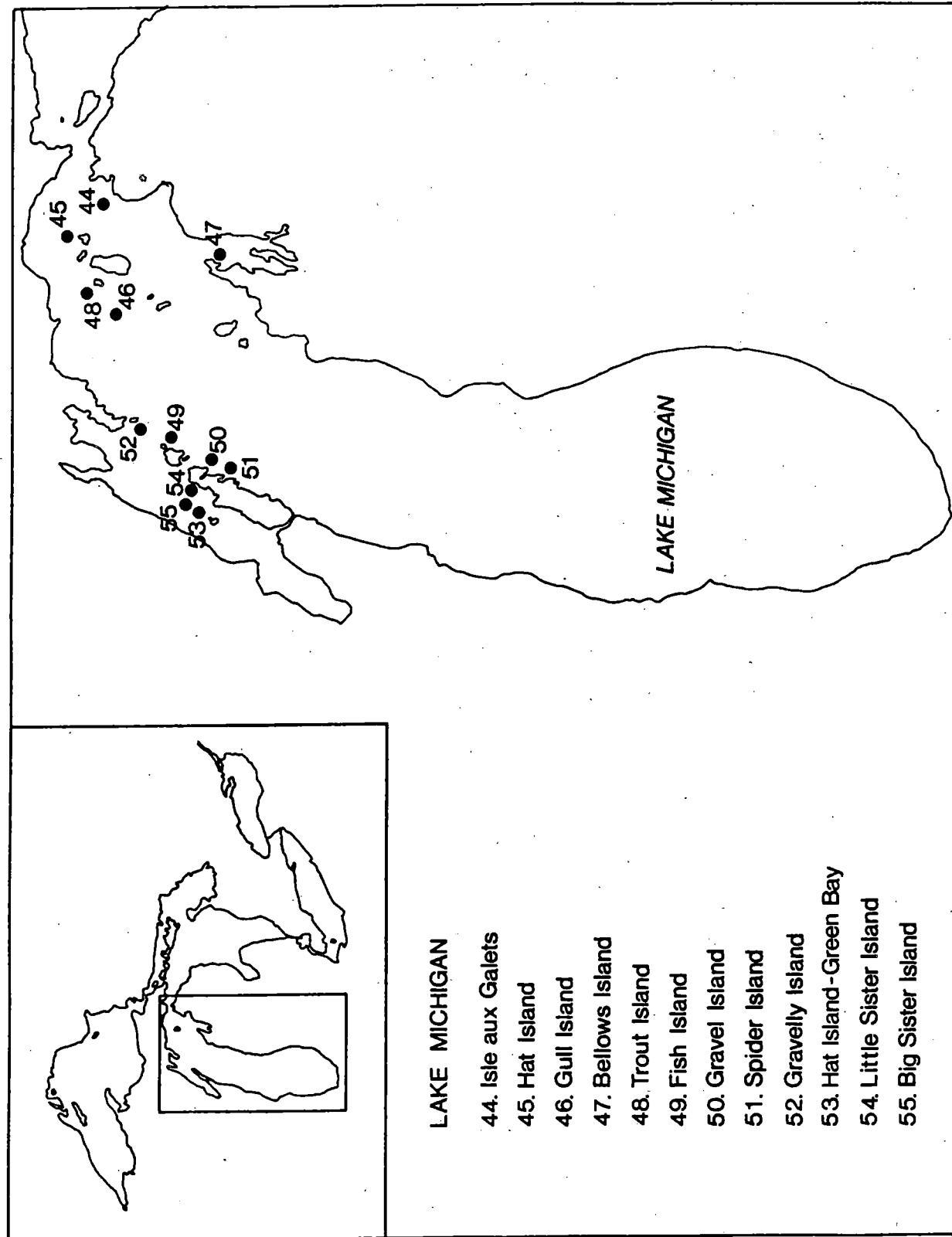


Figure 9. Lake Michigan colonies of fish-eating birds from which eggs were collected for contaminant analysis.

Table 9. The sample size of eggs analyzed in each year (1970–1989) from Lake Michigan arranged by collection site, species sampled, and compound analyzed.

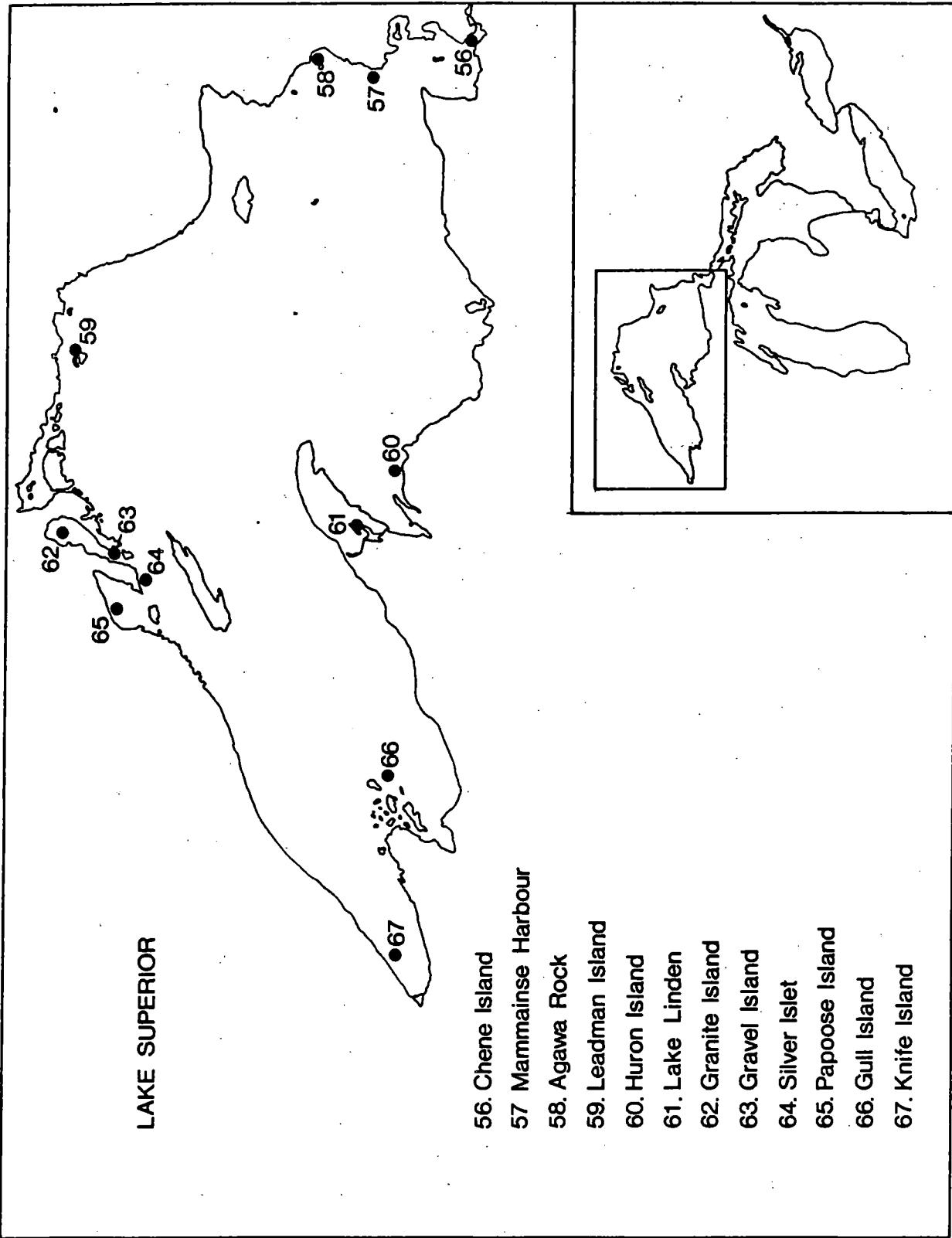
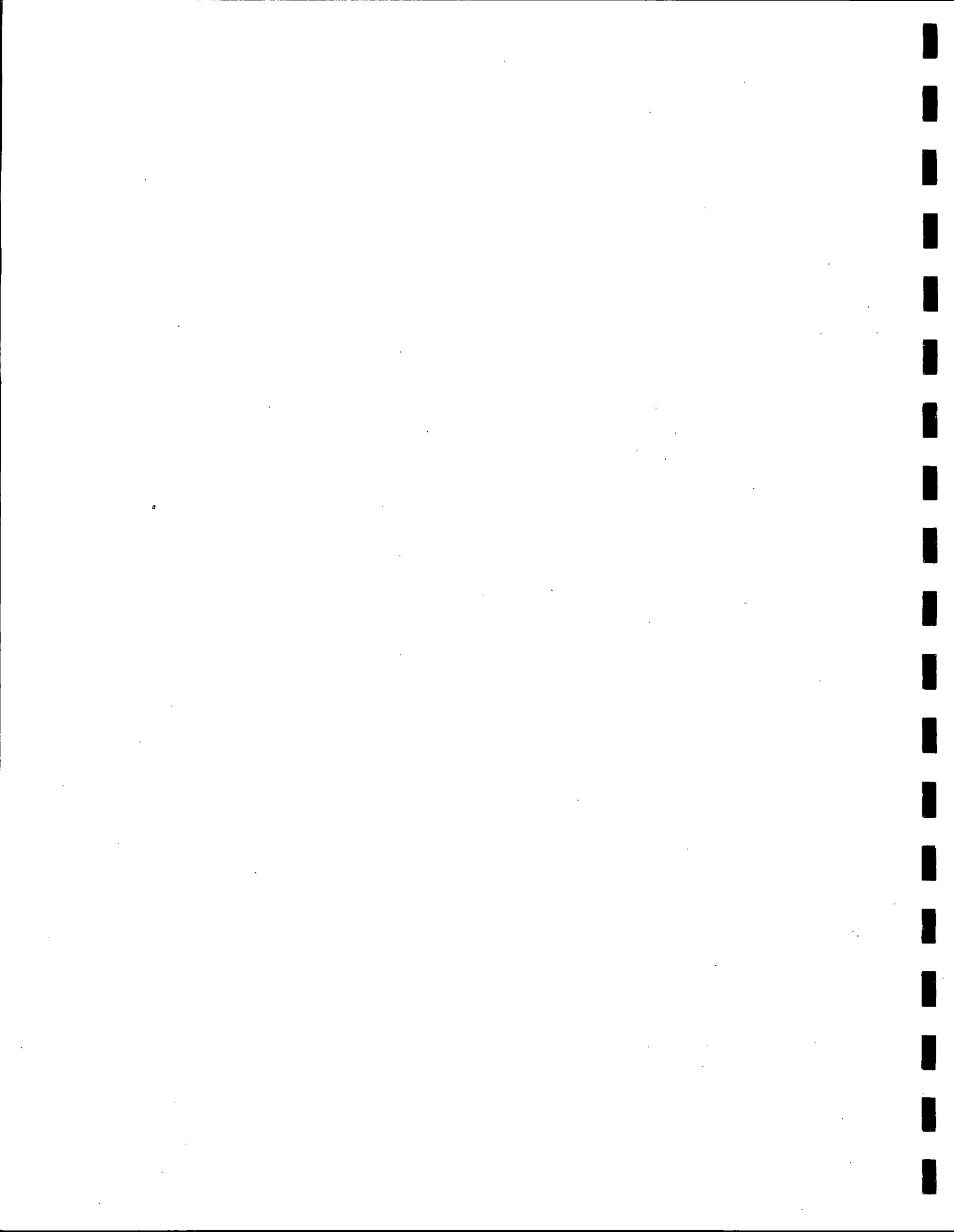


Figure 10. Lake Superior colonies of fish-eating birds from which eggs were collected for contaminant analysis.

Table 10. The sample size of eggs analyzed in each year (1970–1988) from Lake Superior arranged by collection site, species sampled, and compound analyzed.



Methodological and Statistical Notes specific to
Table 11.

1. All analytical data have been calculated on a wet weight basis.
2. All means and standard deviation values are reported at four significant digits. Trailing zeros in these values are truncated.
3. Dioxin and Furan compounds are reported in pg/g.
All other compounds are reported in ug/g.
4. All sample sizes reported as (N=1) in years prior to 1985 represent a sample of one egg used in chemical analysis.
All sample sizes reported as (N=1) in years after 1985 represent a sample of 10 eggs which were pooled and analyzed as a single sample.
5. Analytical results for DDD and DDT which are equal to or less than twice the detection limit (i.e. 0.01 ug/g) should not be considered absolute values. Rather they are indicative of very low levels which are approaching the detection limits of these chemicals.
6. The detection limits used in the analytical determination of PCBs, chlorinated benzenes, and organochlorine pesticides varied with the laboratory and methodology used. Changes in methodology principally affected determination and quantitation of the PCBs. Detection limits have not been determined formally but generally the following can be used as a guide:

All chlorinated benzenes	0.001 ug/g
All organochlorine pesticides	0.005 ug/g
All polychlorinated biphenyls	0.01 ug/g

Detection limits for metals
(based on maximum sample weight of 1 g.):

Arsenic	0.01 ug/g
Cadmium	10 ug/g
Mercury	0.02 ug/g

(Ontario Research Foundation, 1977;1979)

The minimum detection limits for dioxin and furan compounds exist within the ranges listed below. Fluctuations in detection limits occur subject to the cleanliness of the samples at the time of analysis and the condition of the ion source of the mass spectrometer at any given time.

Tetrachlorodioxins/furans	1-2 pg/g
Pentachlorodioxins/furans	2-3 pg/g
Hexachlorodioxins/furans	3-4 pg/g
Heptachlorodioxins/furans	6 pg/g
Octachlorodioxins/furans	8-10 pg/g

7. All PCB data have been expressed as Aroclor 1254:1260 1:1 mixture or Aroclor 1260. In recent years, these values have been obtained by determination of PCB congeners #138 and #180. Earlier results have been checked against more recent results and correction factors applied where necessary.

However, the results from the Aroclor 1254:1260 1:1 mixture appear to be roughly twice that of results obtained by summing all PCB congeners (Σ PCB). Recently, factors have been obtained which convert Aroclor 1254:1260 1:1 mixture results to Σ PCB results (Turle et. al., 1991). Those factors are: 0.461 for results from Lake Ontario, 0.444 for Lake Erie, 0.484 for Lake Huron and 0.450 for Lake Superior. These factors are only applicable to Herring Gull eggs from the Great Lakes (Turle et al., 1991).

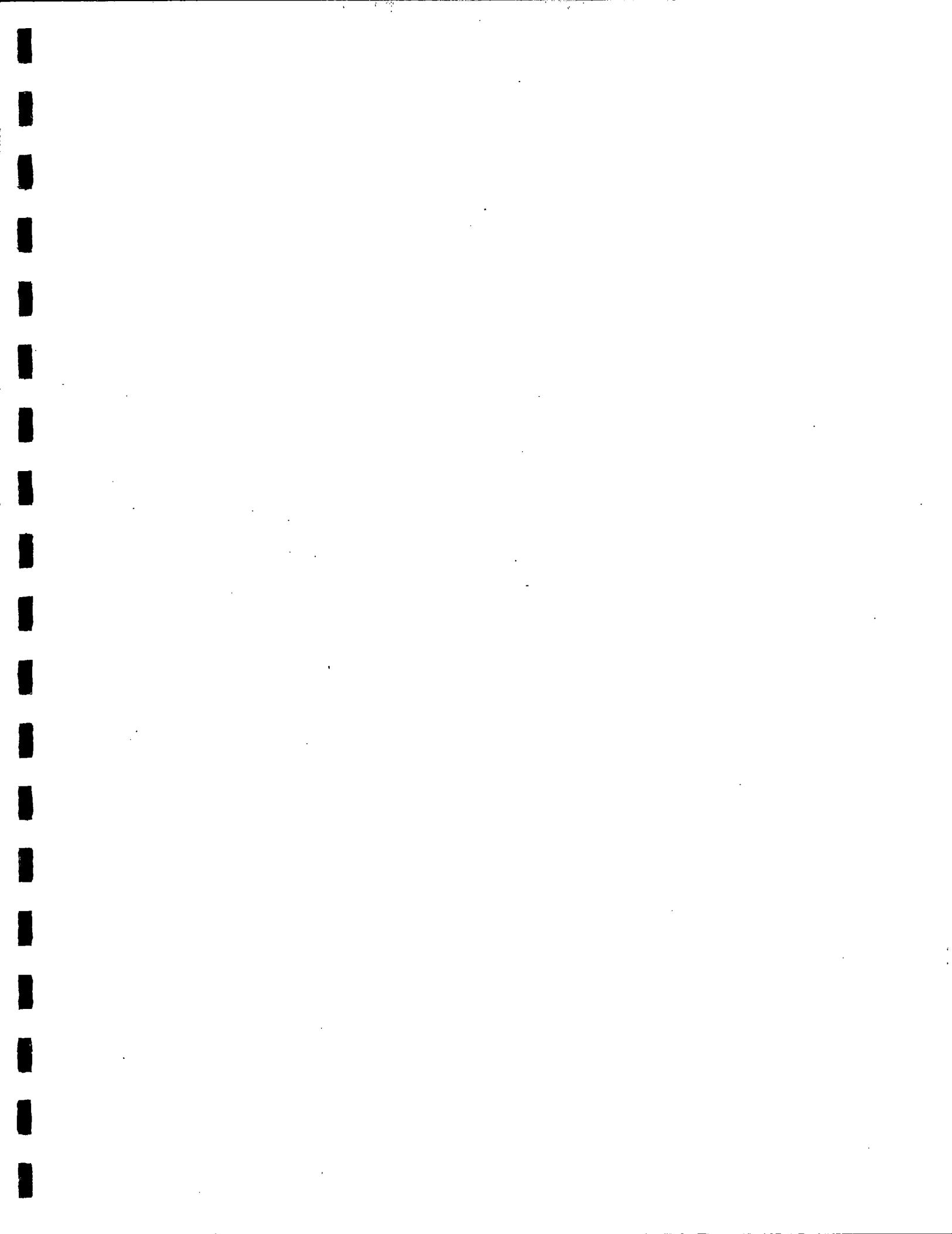
8. Organochlorine pesticide and PCB analyses were conducted under contract at the Ontario Research Foundation or ORTECH Corporation, under the direction of Dr.L.Reynolds from 1972 to 1985 (Reynolds and Cooper, 1975). From 1986, analyses have been performed by H.Won at the CWS National Wildlife Research Centre (Peakall et al., 1986).

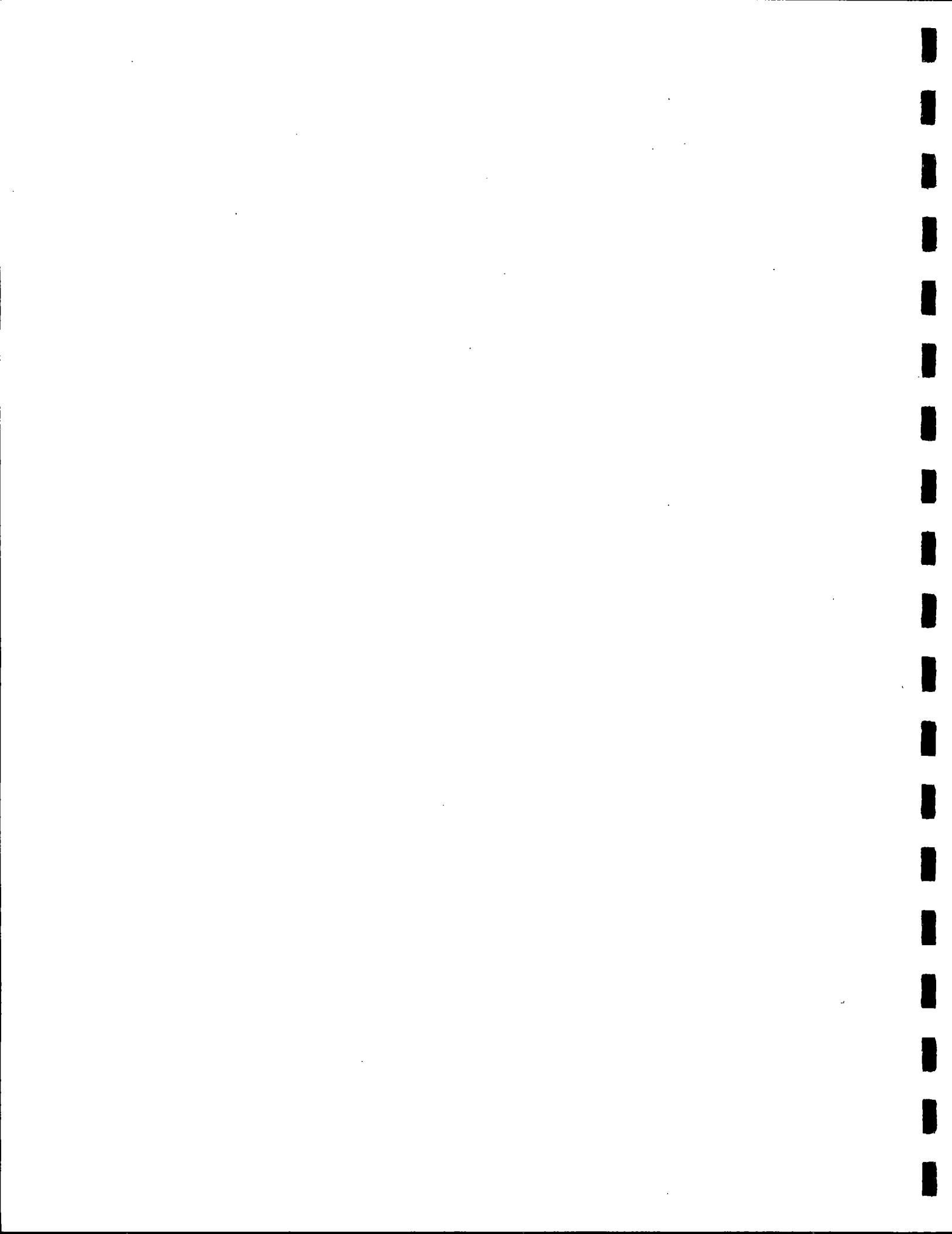
All dioxin analyses were performed by M.Simon and M.Mulvihill of CWS National Wildlife Research Centre (Norstrom et al., 1986). These methods have been automated.

Metal analyses were performed by Ortech, Missisauga, Ontario, and Berringer-Magenta Corporation, Toronto, Ontario. Methods of analysis are described in Struger et al., 1987.

9. Methodology changes in pesticide and PCB analyses have been summarised along with quality assurance principles for results obtained by contract (Turle et. al., 1988).

10. Chlordane isomers have been presented as alpha-chlordane, trans-chlordane, and oxy-chlordane. Alpha-chlordane is synonymous with cis-chlordane, and trans-chlordane is synonymous with gamma-chlordane.





Section 1.

Index to Contaminant Data, summarized by Location.

Table 11. Contaminant Data, Summarized by Location

Index to contaminant data, summarized by Location.

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TABLE 11. Contaminant data, summarized by Location.*
ST. LAWRENCE RIVER, STRACHAN ISLAND

HERRING GULL		YEAR	
PERCENT LIPID	N	86	88
IN EGG	MEAN	1	1
	STD	7.5	9.3
ALPHA-	N	0.005	.0073
CHLORDANE	MEAN	1	1
	STD	.0013	
GAMMA-	N		
CHLORDANE	MEAN		
	STD		
OXY-	N	0.126	.1044
CHLORDANE	MEAN	1	1
	STD		
1234-	N		
CHLOROBENZENE	MEAN		
	STD		
1235- / 1245-	N		
CHLOROBENZENE	MEAN		
	STD		
PENTA-	N		
CHLOROBENZENE	MEAN		
	STD		
HEXA-	N	0.0103	
CHLOROBENZENE	MEAN	1	1
	STD		
DDD	N	0.052	.0523
	MEAN	1	1
	STD	0.008	0.003
DDE	N	3.59	3.97
	MEAN	1	1
	STD		

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*
ST. LAWRENCE RIVER, STRACHAN ISLAND

HERRING GULL		YEAR	
		86	88
DDT	N MEAN STD	1 0.04 .0255	1 1 .0255
DIELDRIN	N MEAN STD	1 0.16 .1258	1 1 .1258
2378- TETRACHLORO- DIBENZO-P- DIOXIN	N MEAN STD	1 57 50	1 57 50
12378- PENTACHLORO- DIBENZO-P- DIOXIN	N MEAN STD	1 9 5	1 9 5
123678- HEXAChLORO- DIBENZO-P- DIOXIN	N MEAN STD	1 13 9	1 13 9
1234678- HEPTACHLORO- DIBENZO-P- DIOXIN	N MEAN STD	1 6 6	1 6 6
OCTACHLORO- DIBENZO-P- DIOXIN	N MEAN STD	1 10 9	1 10 9
2378- TETRACHLORO- DIBENZOFURAN	N MEAN STD	1 ND ND	1 ND ND
23478- PENTACHLORO- DIBENZOFURAN	N MEAN STD	1 9 5	1 9 5

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.
ST. LAWRENCE RIVER, STRACHAN ISLAND

HERRING GULL		YEAR	
		86	88
123478- / 123467- HEXACHLORO- DIBENZOFURAN	N MEAN STD	1 4 ND	1 ND
123678- HEXACHLORO- DIBENZOFURAN	N MEAN STD	1 4 ND	1 ND
HEPTACHLOR EPOXIDE	N MEAN STD	0.089 1 0.0645	1 0.0645
ALPHA- HEXACHLORO- CYCLOHEXANE	N MEAN STD	0.0026 1 .0026	1 1
BETA- HEXACHLORO- CYCLOHEXANE	N MEAN STD	0.012 1 .0088	1 1
GAMMA- HEXACHLORO- CYCLOHEXANE	N MEAN STD	0.024 1 .0024	1 1
MIREX	N MEAN STD	1 1 .8186	1 1
PHOTOMIREX	N MEAN STD	0.342 1 .3183	1 1
CIS-NONACHLOR N	N MEAN STD	0.05 1 0.04	1 1

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.
ST. LAWRENCE RIVER, STRACHAN ISLAND

HERRING GULL		YEAR	
		86	88
TRANS-	N	1	1
NONACHLOR	MEAN	0.029	.0911
	STD		
OCTACHLORO-	N	1	1
STYRENE	MEAN	0.026	
	STD		
PCB 1260	N	1	1
	MEAN	12.4	13.04
	STD		
PCB 1254:1260 (conversion to total PCB congener conc see p. 39)	N	1	1
	MEAN	28.9	30.73
	STD		

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*
LAKE ONTARIO, SNAKE ISLAND

HERRING GULL				YEAR								
	77	78	79	80	81	82	83	84	85	86	87	88
PERCENT LIPID IN EGG	10 9.64 1.508	10 9.68 1.571	10 8.55 .7649	10 7.88 .6125	10 9.51 .7666	11 8.35 .5126	10 8.064 .6918	10 9.12 .7361	10 9.19 .6918	10 7.48 .6624	10 8.9 .8417	1 1 8.8
ARSENIC	N 10 0.015	N MEAN STD	N MEAN STD	N MEAN STD	N MEAN STD	N MEAN STD	N MEAN STD	N MEAN STD	N MEAN STD	N MEAN STD	N MEAN STD	
CADMIUM	10 .0155 .0332	10 .047 .0236	10 0.108 0.0405	10 0.078 0.0437	10 0.221 0.1	1 0.02 .0052	1 0.023 .0049	1 0.023 .0052	1 0.087 .0037	1 0.05 .0034	1 0.016 .0033	1 0.016 .0016
ALPHA-CHLORDANE	N MEAN STD	N MEAN STD	N MEAN STD	N MEAN STD	N MEAN STD	N MEAN STD	N MEAN STD	N MEAN STD	N MEAN STD	N MEAN STD	N MEAN STD	
GAMMA-CHLORDANE	N MEAN STD	N MEAN STD	N MEAN STD	N MEAN STD	N MEAN STD	N MEAN STD	N MEAN STD	N MEAN STD	N MEAN STD	N MEAN STD	N MEAN STD	
OXY-CHLORDANE	N MEAN STD	N MEAN STD	N MEAN STD	N MEAN STD	N MEAN STD	N MEAN STD	N MEAN STD	N MEAN STD	N MEAN STD	N MEAN STD	N MEAN STD	
1,2,3-CHLOROBENZENE	N MEAN STD	N MEAN STD	N MEAN STD	N MEAN STD	N MEAN STD	N MEAN STD	N MEAN STD	N MEAN STD	N MEAN STD	N MEAN STD	N MEAN STD	
1,2,4-CHLOROBENZENE	N MEAN STD	N MEAN STD	N MEAN STD	N MEAN STD	N MEAN STD	N MEAN STD	N MEAN STD	N MEAN STD	N MEAN STD	N MEAN STD	N MEAN STD	
1,3,5-CHLOROBENZENE	N MEAN STD	N MEAN STD	N MEAN STD	N MEAN STD	N MEAN STD	N MEAN STD	N MEAN STD	N MEAN STD	N MEAN STD	N MEAN STD	N MEAN STD	

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*
LAKE ONTARIO, SNAKE ISLAND

		HERRING GULL						YEAR					
		77	78	79	80	81	82	83	84	85	86	87	88
1234-	N												
CHLOROBENZENE	MEAN												
	STD												
1235-/ 1245-	N												
CHLOROBENZENE	MEAN												
	STD												
PENTA-	N												
CHLOROBENZENE	MEAN												
	STD												
HEXA-	N												
CHLOROBENZENE	MEAN												
	STD												
DDD	N												
	MEAN												
	STD												
DDE	N												
	MEAN												
	STD												
DDT	N												
	MEAN												
	STD												
DIELDRIN	N												
	MEAN												
	STD												
2378-	N												
TETRACHLORO-	MEAN												
DIBENZO-P-	STD												
DIOXIN													

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.
LAKE ONTARIO, SNAKE ISLAND

		YEAR											
		77	78	79	80	81	82	83	84	85	86	87	88
12378-	N MEAN STD					1 11	1 10	1 14	1 1	1 1	1 10	1 6	1 7
PENTACHLORO-													
DIBENZO-P-													
DIOXIN													
123678-	N MEAN STD				1 20	1 14	1 17	1 20	1 1	1 1	1 11	1 10	1 6
HEPTACHLORO-													
DIBENZO-P-													
DIOXIN													
1234678-	N MEAN STD					1 ND	1 ND	1 5	1 6	1 6	1 6	1 6	1 3
HEPTACHLORO-													
DIBENZO-P-													
DIOXIN													
OCTACHLORO-	N MEAN STD				1 10	1 14	1 24	1 20	1 1	1 1	1 10	1 10	1 7
DIBENZO-P-													
DIOXIN													
2378-	N MEAN STD							1 2	1 ND	1 1	1 ND	1 2	1 1
TETRACHLORO-													
DIBENZOFURAN													
23478-	N MEAN STD								1 8	1 8	1 8	1 5	1 5
PENTACHLORO-													
DIBENZOFURAN													
123478- /	N MEAN STD								1 5	1 4	1 4	1 5	1 5
123467- /													
HEPTACHLORO-													
DIBENZOFURAN													
123678-	N MEAN STD								1 5	1 4	1 4	1 5	1 5
HEPTACHLORO-													
DIBENZOFURAN													
HEPTACHLOR	N MEAN STD				10 0.142	10 0.093	10 0.071	10 0.089	10 0.136	10 0.121	10 0.109	10 0.093	1 0.0815
EPOXIDE													

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.
LAKE ONTARIO, SNAKE ISLAND

HERRING GULL		YEAR											
		77	78	79	80	81	82	83	84	85	86	87	88
ALPHA-HEXACHLOROCYCLOHEXANE	N MEAN STD												
BETA-HEXACHLOROCYCLOHEXANE	N MEAN STD	0.238 .2557	0.097 .0189	10 0.065	10 0.038	10 0.043	10 0.0321	11 0.0336	10 0.035	10 0.015	10 0.014	1 0.0031	1 0.0132
GAMMA-HEXACHLOROCYCLOHEXANE	N MEAN STD												
LEAD	N MEAN STD												
TOTAL MERCURY	N MEAN STD												
MIREX	N MEAN STD	2.909 1.09	1.738 0.512	10 1.958	10 1.583	10 2.799	10 2.482	9 1.503	10 2.019	10 1.684	10 1.206	1 .8605	1 .9439
PHOTOMIREX	N MEAN STD												
CIS-NONACHLOR	N MEAN STD												
TRANS-NONACHLOR	N MEAN STD												

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*
LAKE ONTARIO, SNAKE ISLAND

HERRING GULL			YEAR											
			77	78	79	80	81	82	83	84	85	86	87	88
OCTACHLORO-	N													
STYRENE	MEAN													
	STD													
PCB 1260	N	101.6	55.24	57.98	46.45	76.59	52.31	38.18	45.44	10	10	10	1	
	MEAN	28.98	18.09	16	20.65	38.35	8.667	14.9	13.49					
	STD													
PCB 1254;1260 (conversion to total PCB congener conc see pg. 39)	N	118.4	70.68	62.9	53.49	85.62	61.48	46.18	53.34	11	10	10	1	
	MEAN	33.06	20.46	17.78	23.62	40.65	12.1	18.11	15.67					
	STD													
SELENIUM	N	0.67												
	MEAN	10												
	STD	.2111												

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*
LAKE ONTARIO, WEST BROTHERS ISLAND

HERRING GULL		YEAR		
		73	74	75
PERCENT LIPID	N	16	10	10
IN EGG	MEAN	9.931	7.21	7.81
	STD	4.072	1.423	1.737
HEXA-	N	16	10	10
CHLOROBENZENE	MEAN	1.154	.5567	.2166
	STD	.9391	.3883	.2029
DDD	N	16	10	10
	MEAN	1.026	0.308	.0763
	STD	.6358	.3044	.0321
DDE	N	16	10	10
	MEAN	41.98	21.37	23.58
	STD	27.44	9.148	6.094
DDT	N	16	10	10
	MEAN	.7789	.9993	.2394
	STD	.8406	1.058	.1681
DIELDRIN	N	16	10	10
	MEAN	.4075	0.471	0.347
	STD	.2237	.2492	.1962
HEPTACHLOR	N	16	10	10
EPOXIDE	MEAN	.0956	0.171	0.142
	STD	.0722	.0941	.0394
BETA,-	N	16		
HEXAChLORO-	MEAN	.0925		
CYCLOHEXANE	STD	.0586		
TOTAL MERCURY	N	16	10	10
	MEAN	.4844	0.458	0.657
	STD	.2001	.1838	.2614

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*
LAKE ONTARIO, WEST BROTHERS ISLAND

HERRING GULL				YEAR			
		73	74	75			
MIREX	N				10	10	
	MEAN				6.59	5.97	
	STD				2.804	2.275	
PCB 1260	N				16	10	
	MEAN				114.4	106.4	140.4
	STD				82.9	37	40.32
PCB 1254:1260 (conversion to total PCB congener conc see pg. 39)	N				16	10	
	MEAN				132.8	140.5	179.6
	STD				96.6	48.84	51.15

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*
LAKE ONTARIO, PIGEON ISLAND

HERRING GULL		YEAR	
		72	81
PERCENT LIPID IN EGG		1 5.4	10 8.72 .5712
	MEAN		10 8.14 .9778
	STD		.1209
ALPHA-CHLORDANE	N MEAN	1.0 0.272	8 .0262
	STD		.0074
GAMMA-CHLORDANE	N MEAN	2 0.12	10 0.011
	STD		.0032
OXY-CHLORDANE	N MEAN	1.0 0.222	10 0.309
	STD		.1212 .0694
1234-CHLOROBENZENE	N MEAN	1.0 0.005	10 0.0051
	STD		.0025
1235- / 1245-CHLOROBENZENE	N MEAN	1.0 0.003	10 0.0042
	STD		0.002
PENTA-CHLOROBENZENE	N MEAN	1.0 0.0226	10 0.0187
	STD		.0029
HEXA-CHLOROBENZENE	N MEAN	1 0.779	10 2.665 .1151
	STD		.0335
DDD	N MEAN	1 0.007	10 0.104 .0357
	STD		.0213 .0946

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*
LAKE ONTARIO, PIGEON ISLAND

HERRING GULL				YEAR			
	N	MEAN	STD	72	81	82	
DDE				1	10	10	
	N	MEAN	STD	35.6	13.98	10.43	
					8.456	2.887	
DDT				0.002	0.076	0.163	
	N	MEAN	STD		0.031	0.062	
DIELDRIN				1	10	10	
	N	MEAN	STD	0.75	0.349	0.335	
					.1031	.0851	
HEPTACHLOR				1	8	10	
EPOXIDE				0.5	1.438	0.118	
	N	MEAN	STD		0.0463	0.0204	
BETA-HEXACHLORO-CYCLOHEXANE				10	10	10	
	N	MEAN	STD	0.065	0.036		
					.0217	.0107	
TOTAL MERCURY				1	10	10	
	N	MEAN	STD	0.81	0.51	0.877	
					.1697	.2474	
MIREX				10	10	10	
	N	MEAN	STD	2.837	3.064		
					1.465	.7888	
TRANS-NONACHLOR				10	10	10	
	N	MEAN	STD	0.153			
					.0576		

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.
LAKE ONTARIO, PIGEON ISLAND

HERRING GULL		YEAR		
		72	81	82
PCB 1260	N	1	10	10
	MEAN	151	74.72	55.1
	STD		24.42	18.7
PCB 1254:1260 (conversion to total PCB congener conc see pg. 39)	N	10	10	10
	MEAN	83.5	61.56	61.56
	STD	27.07	21.37	21.37

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

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TABLE 11. Contaminant data, summarized by Location.*
LAKE ONTARIO, PIGEON ISLAND

DOUBLE-CRESTED CORMORANT	YEAR
PERCENT LIPID IN EGG	10 MEAN STD
1234- CHLOROBENZENE	N MEAN STD
1235-/ 1245- CHLOROBENZENE	N MEAN STD
PENTA- CHLOROBENZENE	N MEAN STD
HEXA- CHLOROBENZENE	N MEAN STD
DDE	N MEAN STD
PCB 1260	N MEAN STD
PCB 1254:1260 (conversion to total PCB congener conc see pg. 39)	N MEAN STD

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*
LAKE ONTARIO, PIGEON ISLAND

CASPIAN TERN	YEAR
PERCENT LIPID N IN EGG	81
MEAN	8
STD	8.3 1.243
1234- CHLOROBENZENE	N MEAN STD
	8 .0009 .0012
1235- / 1245- CHLOROBENZENE	N MEAN STD
	8 .0005 0
PENTA- CHLOROBENZENE	N MEAN STD
	8 .0044 0.003
HEXA- CHLOROBENZENE	N MEAN STD
	8 .0638 .0449
DDE	N MEAN STD
	8 5.229 1.601
MIREX	N MEAN STD
	8 1.571 .5303
PCB 1260	N MEAN STD
	8 31.64 14.05
PCB 1254:1260 (conversion to total PCB congener conc see pg. 39)	N MEAN STD
	8 39.28 17.77

*All units measured on wet weight basis.

Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*
LAKE ONTARIO, PIGEON ISLAND

BLACK-CROWNED NIGHT-HERON		YEAR	
PERCENT LIPID	N	72.	82
IN EGG	MEAN	1	12
	STD	9.6	5.983
			1.213
ALPHA-	N	11	
CHLORDANE	MEAN	.0214	
	STD	.0158	
GAMMA-	N	12	
CHLORDANE	MEAN	.0075	
	STD	.0032	
OXY-	N	12	
CHLORDANE	MEAN	.1658	
	STD	.1384	
1234-	N	12	
CHLOROBENZENE	MEAN	.0005	
	STD	.0008	
1235-/ 1245-	N	12	
CHLOROBENZENE	MEAN	.0003	
	STD	0	
PENTA-	N	12	
CHLOROBENZENE	MEAN	.0009	
	STD	.0014	
HEXA-	N	1	12
CHLOROBENZENE	MEAN	0.09	.0416
	STD		.0234
DDD	N	1	12
	MEAN	0.08	0.11
	STD		0.136

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.
LAKE ONTARIO, PIGEON ISLAND

BLACK-CROWNED NIGHT-HERON			YEAR		
	N		72	82	
DDE	N MEAN STD		1 13 4.827 2.327	12	
DDT	N MEAN STD		.0112 1	.0675 .0538	
DIELDRIN	N MEAN STD		0.28 1	.2833 .4945	
HEPTACHLOR EPOXIDE	N MEAN STD		.0005 1	.0475 .0214	
ALPHA- HEXACHLORO- CYCLOHEXANE	N MEAN STD			12 .0025 0	
BETA- HEXACHLORO- CYCLOHEXANE	N MEAN STD			12 .0327 .0235	
TOTAL MERCURY	N MEAN STD			1 0.12	
MIREX	N MEAN STD			12 1.035 .6836	
TRANS- NONACHLOR	N MEAN STD			12 1.025 .0586	

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*
LAKE ONTARIO, PIGEON ISLAND

BLACK-CROWNED NIGHT-HERON			YEAR	
	N		72	82
PCB 1260	N MEAN STD		55.1 1 21.99 10.68	
PCB 1254:1260 (conversion to total PCB congener conc see pg. 39)	N MEAN STD		12 24.39 11.77	

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*
LAKE ONTARIO, LITTLE GALLOO ISLAND

HERRING GULL		YEAR	
		81	82
PERCENT LIPID IN EGG	N	10 9.2 1.134	10 8.68 .7714
ALPHA-CHLORDANE	N	10 0.201 .0538	10 0.021 .0057
GAMMA-CHLORDANE	N	9 .0005	10 .0095
OXY-CHLORDANE	N	10 0.202 .0725	10 0.286 0.186
1,234-CHLOROBENZENE	N	10 .0091 .0012	10 .0061 .0022
1,235-/ 1,245-CHLOROBENZENE	N	10 .0073 0.004	10 .0069 .0028
PENTA-CHLOROBENZENE	N	10 .0253 .0084	10 .0199 .0055
HEXA-CHLOROBENZENE	N	10 .2366 .0826	10 .1035 .0148
DDD	N	10 0.109 .0321	10 0.469 .0832

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*
LAKE ONTARIO, LITTLE GALLOO ISLAND

HERRING GULL		YEAR	
		81	82
DDE	N MEAN STD	10 8.437 3.076	10 8.27 3.717
DDT	N MEAN STD	10 0.076 .0276	10 0.09 0.035
DIELDRIN	N MEAN STD	10 0.317 .1151	10 0.36 .2609
HEPTACHLOR EPOXIDE	N MEAN STD	10 0.123 .0419	10 0.105 .0513
ALPHA- HEXACHLORO- CYCLOHEXANE	N MEAN STD	10 0.005 0.002	10 0.005 0.002
BETA- HEXACHLORO- CYCLOHEXANE	N MEAN STD	10 0.058 .0204	10 0.04 .0115
TOTAL MERCURY	N MEAN STD	10 0.468 .1698	10 0.801 .1419
MIREX	N MEAN STD	10 2.246 .8507	10 3.461 1.545
TRANS- NONACHLOR	N MEAN STD	10 0.551 .2779	10 0.551 .2779

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.
LAKE ONTARIO, LITTLE GALLOO ISLAND

HERRING GULL		YEAR	
		81	82
PCB 1260	N	10	10
	MEAN	59.34	44.22
	STD	20.32	21.21
PCB 1254:1260 (conversion to total PCB congener conc see pg. 39)	N	10	10
	MEAN	67.13	53.88
	STD	22.76	24.86

*All units measured on wet weight basis. Dioxins and furans measured in Pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*
LAKE ONTARIO, LITTLE GALLOO ISLAND

DOUBLE-CRESTED CORMORANT	YEAR
	81
PERCENT LIPID N	10
IN EGG MEAN	4.23
STD	.5813
1234- N	10
CHLOROBENZENE MEAN	.0039
STD	.0106
1235- / 1245- N	10
CHLOROBENZENE MEAN	0.006
STD	.0172
PENTA- N	10
CHLOROBENZENE MEAN	.0625
STD	.1822
HEXA- N	10
CHLOROBENZENE MEAN	.1517
STD	.3021
DDE N	10
MEAN	5.8
STD	1.739
MIREX N	10
MEAN	1.237
STD	0.572
PCB 1260 N	10
MEAN	33.08
STD	12.93
PCB 1254:1260 N	10
(conversion MEAN	37.87
to total PCB STD	14.66
congener conc see pg. 39)	

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*
LAKE ONTARIO, LITTLE GALLOO ISLAND

BLACK-CROWNED NIGHT-HERON		YEAR
		82
PERCENT LIPID IN EGG	N MEAN STD	1 5.1
ALPHA-CHLORDANE	N MEAN STD	1 0.02
GAMMA-CHLORDANE	N MEAN STD	1 0.005
OXY-CHLORDANE	N MEAN STD	1 0.11
1234-CHLOROBENZENE	N MEAN STD	1 .0003
1235-/ 1245-CHLOROBENZENE	N MEAN STD	1 .0003
PENTA-CHLOROBENZENE	N MEAN STD	1 0.004
HEXA-CHLOROBENZENE	N MEAN STD	1 0.046
DDD	N MEAN STD	1 0.04

*All units measured on wet weight basis.

Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*
LAKE ONTARIO, LITTLE GALLOO ISLAND

	BLACK-CROWNED NIGHT-HERON	YEAR
DDE	N 1 MEAN 4.08 STD	82
DDT	N 1 MEAN 0.05 STD	
DIELDRIN	N 1 MEAN 0.24 STD	
HEPTACHLOR EPOXIDE	N 1 MEAN 0.04 STD	
ALPHA-HEXACHLOROCYCLOHEXANE	N 1 MEAN .0025 STD	
BETA-HEXACHLOROCYCLOHEXANE	N 1 MEAN 0.01 STD	
MIREX	N 1 MEAN 0.84 STD	
TRANS-NONACHLOR	N 1 MEAN 0.06 STD	
PCB 1260	N 1 MEAN 17.8 STD	

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g. 1-32

TABLE 11. Contaminant data, summarized by Location.
LAKE ONTARIO, LITTLE GALLOO ISLAND

BLACK-CROWNED NIGHT-HERON	YEAR
	82
PCB 1254:1260 N (conversion to total PCB congener conc see pg. 39)	18.9
	1

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.
LAKE ONTARIO, SCOTCH BONNET ISLAND

HERRING GULL	YEAR									
	71	72	74	76	77	78	79	80	81	82
PERCENT LIPID	N	1	1	15	1	8	1	1	1	1
IN EGG	MEAN	8.4	8.7	7.3	9.487	7.7	9.588	7.0	7.8	7.1
	STD			.8983		.5842				
ALPHA-	N				15	8				
CHLORDANE	MEAN				1533	0.205				
	STD				.1236	.0657				
GAMMA-	N				1					
CHLORDANE	MEAN				0.01					
	STD									
OXY-	N				1					
CHLORDANE	MEAN				0.58					
	STD									
1234-	N				1					
CHLOROBENZENE	MEAN				0.005					
	STD									
1235- / 1245-	N				1					
CHLOROBENZENE	MEAN				0.006					
	STD									
PENTA-	N				1					
CHLOROBENZENE	MEAN				0.023					
	STD									
HEXA-	N				1					
CHLOROBENZENE	MEAN				0.214					
	STD									
DDD	N				1					
	MEAN				0.15					
	STD									

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*
LAKE ONTARIO, SCOTCH BONNET ISLAND

HERRING GULL				YEAR												
	71	72	74	76	77	78	79	80	81	82						
DDE	N MEAN STD			15 25.31 13.81		8 18.4 8.47					1 10.4					
DDT	N MEAN STD			0.639 .5097		8 0.275 .0526					1 0.18					
DIELDRIN	N MEAN STD			0.37 .1509		8 3525 0.134					1 0.53					
2378-TETRACHLORODIBENZO-P-DIOXIN	N MEAN STD	1996 1 65	2347 1 24	1 489 518	1 1 22	1 1 10	1 1 7	1 1 10	1 1 10	1 1 229	1 1 229	1 1 204				
12378-PENTACHLORODIBENZO-P-DIOXIN	N MEAN STD	58 1 47		1 1 31	1 1 28							1 1 15				
123678-HEXACHLORODIBENZO-P-DIOXIN	N MEAN STD					1 1 30	1 1 25					1 1 22	1 1 49			
1234678-HEPTACHLORODIBENZO-P-DIOXIN	N MEAN STD	8 1 22		1 1 ND	1 1 10	1 1 115	1 1 12	1 1 13	1 1 13	1 1 ND	1 1 8	1 1 ND	1 1 8			
OCTACHLORODIBENZO-P-DIOXIN	N MEAN STD											1 1 33	1 1 16	1 1 18	1 1 10	
2378-TETRACHLORODIBENZOFURAN	N MEAN STD	5 1 6		1 1 3	1 1 2						1 1 ND	1 1 2	1 1 2	1 1 ND		

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*
LAKE ONTARIO, SCOTCH BONNET ISLAND

HERRING GULL		YEAR									
		71	72	74	76	77	78	79	80	81	82
23478-	N MEAN STD	1 70	1 77	1 25	1 16	1 22	1 11	1 7	1 8	1 8	1 12
PENTACHLORO- DIBENZOFURAN											
123478- / 123467- HEXACHLORO- DIBENZOFURAN	N MEAN STD	1 28	1 38	1 16	1 9	1 19	1 7	1 8	1 7	1 7	1 8
123678- HEXACHLORO- DIBENZOFURAN	N MEAN STD	1 20	1 28	1 13	1 9	1 14	1 6	1 7	1 7	1 10	1 8
HEPTACHLOR EPOXIDE	N MEAN STD				0.144 .0623	0.15 .0421	0.17 .0421			0.16 .0025	1 0.09
ALPHA- HEXACHLORO- CYCLOHEXANE	N MEAN STD						8 .0245	1237 .1237			1 0.72
BETA- HEXACHLORO- CYCLOHEXANE	N MEAN STD										1 3.67
TOTAL MERCURY	N MEAN STD					5 0.358					
MIREX	N MEAN STD						15 3.864	8 3.389			
PHOTOMIREX	N MEAN STD						10 .7225	8 .8114	2.229 1.229		

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*
LAKE ONTARIO, SCOTCH BONNET ISLAND

HERRING GULL			YEAR									
			71	72	74	76	77	78	79	80	81	82
TRANS-	N	MEAN										
NONACHLOR		STD										
PCB 1260	N	MEAN										
		STD										
PCB 1254:1260	N	MEAN										
(conversion												
to total PCB												
congener conc												
see pg. 39)												

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*
LAKE ONTARIO, SCOTCH BONNET ISLAND

DOUBLE-CRESTED CORMORANT		YEAR	
PERCENT LIPID IN EGG		72	75
MEAN	3.457	7	1
STD	1.29	0.6	
HEXA-CHLOROBENZENE	N	.1543	0.005
DDD	N MEAN STD	.1786 0.062	1 0.01
DDE	N MEAN STD	.937 2.187	1 0.55
DDT	N MEAN STD	.2747 .1852	1 .0223
DIELDRIN	N MEAN STD	.2686 .1567	1 0.02
HEPTACHLOR EPOXIDE	N MEAN STD	.0357 .0079	1 0.005
TOTAL MERCURY	N	7	1
	MEAN	0.94	0.53
PCB 1260	N MEAN STD	7 18.3 8.11	1 2.1

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.
LAKE ONTARIO, SCOTCH BONNET ISLAND

DOUBLE-CRESTED CORMORANT	YEAR	
	72	75
PCB 1254:1260 N		
(conversion MEAN		
to total PCB STD		
congener conc		
see pg. 39)		

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g. 1-39

TABLE 11. Contaminant data, summarized by Location.*
LAKE ONTARIO, GULL ISLAND, PRESQU' ILE PROVINCIAL PARK

HERRING GULL		YEAR			
PERCENT LIPID	N	76	77	78	80
IN EGG	MEAN	5	4	19	11
	STD	8.68	7.975	9.484	9.218
		.4324	1.533	.9957	1.173
					1.332
ALPHA-	N	5	4	19	11
CHLORDANE	MEAN	.0082	0.2	.2158	.0155
	STD	.0081	0.092	.1029	.0069
					0.017
					.0067
GAMMA-	N				10
CHLORDANE	MEAN				0.012
	STD				.0042
OXY-	N	5	4	19	11
CHLORDANE	MEAN	.0364	.1583	.3584	.2927
	STD	.0418	.0266	.1982	.1239
					0.428
					0.151
1234-	N				10
CHLOROBENZENE	MEAN				.0029
	STD				.0034
1235-/ 1245-	N				10
CHLOROBENZENE	MEAN				.0005
	STD				
PENTA-	N				10
CHLOROBENZENE	MEAN				.0187
	STD				.0108
HEXA-	N	5	4	19	11
CHLOROBENZENE	MEAN	.0046	.3171	.4516	.1964
	STD	0.008	.0959	.2108	.0768
					0.168
					.1101
DDD	N	5	4	19	11
MEAN	MEAN	0.084	.1786	.2321	.0173
	STD	.0198	.0598	.0.087	.0047
					0.025

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.
LAKE ONTARIO, GULL ISLAND, PRESQU'ILE PROVINCIAL PARK

HERRING GULL				YEAR			
	N	MEAN	STD	76	77	78	80
DDE	N	5	4	19	11	10	
	MEAN	21.5	20.18	19.12	7.345	12.28	
	STD	14.67	6.105	9.043	2.245	4.509	
DDT	N	5	4	19	11	10	
	MEAN	.1296	.1868	.2895	.1182	0.118	
	STD	.0825	.0553	.1231	.0424	.0718	
DIELDRIN	N	5	4	19	11	10	
	MEAN	0.216	0.445	.4237	.3382	0.314	
	STD	.1242	.1196	.2572	.3557	.1141	
HEPTACHLOR	N	5	4	19	11	10	
EPOXIDE	MEAN	0.064	0.19	.2037	.2127	0.126	
	STD	.0195	.0523	.0826	.0976	.0546	
ALPHA-	N				11		
HEXACHLORO-	MEAN				0.005		
CYCLOHEXANE	STD				0		
BETA-	N	4	4	19	11	10	
HEXACHLORO-	MEAN	0.02	0.135	.1205	.0536	.0431	
CYCLOHEXANE	STD	.0082	.0569	.0635	.0112	.0382	
GAMMA-	N				11		
HEXACHLORO-	MEAN				.0005		
CYCLOHEXANE	STD				0		
LEAD	N				1		
	MEAN				0.04		
	STD						
TOTAL MERCURY	N	5			1	10	
	MEAN	0.368			0.31	0.581	
	STD	.1213				.2297	

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.
LAKE ONTARIO, GULL ISLAND, PRESQU' ILE PROVINCIAL PARK

HERRING GULL			YEAR					
			76	77	78	80	82	
MIREX	N		5	4	19	11	10	
	MEAN		.0005	3.625	4.226	2.005	2.782	
	STD		0	.9307	2.846	.6724	1.391	
PHOTOMIREX	N		4	19	11			
	MEAN		1.223	1.626	.6791			
	STD		.3717	.9958	.3122			
TRANS-NONACHLOR	N					10		
	MEAN					0.068		
	STD					.0308		
PCB 1260	N		5	4	19	11	10	
	MEAN		121.9	96.55	100.2	52.51	60.46	
	STD		40.41	27.29	55.95	12.27	19.79	
PCB 1254:1260 (conversion to total PCB congener conc see pg. 39)	N		5	4	19	11	10	
	MEAN		148.5	116.1	121.5	61.86	70.8	
	STD		51.43	35.53	70.92	14.45	22.7	

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.
LAKE ONTARIO, GULL ISLAND, PRESQU' ILE PROVINCIAL PARK

COMMON TERN	YEAR
PERCENT LIPID	75
IN EGG	4 MEAN .9557
HEXA-CHLOROBENZENE	4 MEAN .1375 STD .0866
DDD	N MEAN STD 4 .0538 .0439
DDE	N MEAN STD 4 2.978 1.774
DDT	N MEAN STD 4 .0447 .0182
DIELDREN	N MEAN STD 4 0 0.5 .2617
HEPTACHLOR EPOXIDE	N MEAN STD 4 .0625 .0525
TOTAL MERCURY	N MEAN STD 4 0.295 0.09
PCB 1260	N MEAN STD 4 25.5 7.625

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.
LAKE ONTARIO, GULL ISLAND, PRESQU' ILE PROVINCIAL PARK

COMMON TERM	YEAR
	75
PCB 1254:1260 (conversion to total PCB congener conc see pg. 39)	4 30.38 7.02

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*
LAKE ONTARIO, LESLIE ST. SPIT

HERRING GULL	YEAR	
PERCENT LIPID IN EGG	78	88
MEAN	8.7	1
STD	1.51	8.6
ALPHA-CHLORDANE	N MEAN STD	.1433 .0473 1 .0145
GAMMA-CHLORDANE	N MEAN STD	.0013 1 .0013
OXY-CHLORDANE	N MEAN STD	.1975 .1024 4 .1391
1234-CHLOROBENZENE	N MEAN STD	.0175 1 .0175
1235-/ 1245-CHLOROBENZENE	N MEAN STD	.0237 1 .0237
PENTA-CHLOROBENZENE	N MEAN STD	.0103 1 .0103
HEXA-CHLOROBENZENE	N MEAN STD	.2975 0.09 4 .0527
DDD	N MEAN STD	1 .0137

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.
LAKE ONTARIO, LESLIE ST. SPIT

HERRING GULL		YEAR	
		78	88
DDE	N MEAN STD	4 9.96 3.89	1 3.343
DDT	N MEAN STD	4 0.09 .0583	1 .03883
DIELDRIN	N MEAN STD	4 0.275 .0265	1 .1205
2378-	N MEAN STD	1 40	
TETRACHLORO- DIBENZO-P- DIOXIN			
12378-	N MEAN STD	1 7	
PENTACHLORO- DIBENZO-P- DIOXIN			
123678-	N MEAN STD	1 15	
HEXACHLORO- DIBENZO-P- DIOXIN			
1234678-	N MEAN STD	1 8	
HEPTACHLORO- DIBENZO-P- DIOXIN			
OCTACHLORO- DIBENZO-P- DIOXIN	N MEAN STD	1 11	
2378-	N MEAN STD	1 ND	
TETRACHLORO- DIBENZOFURAN			

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.
LAKE ONTARIO, LESLIE ST. SPIT

HERRING GULL	YEAR	
	78	88
23478- N	1	
PENTACHLORO- MEAN	3	
DIBENZOFURAN STD	5	
123478- / N	1	
123467- MEAN		
HEXACHLORO- STD		
DIBENZOFURAN		
123678- N	1	
HEXACHLORO- MEAN		
DIBENZOFURAN STD		
HEPTACHLOR N	4	
EPOXIDE MEAN	.0667	
STD	.0126	
ALPHA- N	1	
HEXACHLORO- MEAN		
CYCLOHEXANE STD		
BETA- N	4	
HEXACHLORO- MEAN		
CYCLOHEXANE STD		
GAMMA- N	1	
HEXACHLORO- MEAN		
CYCLOHEXANE STD		
MIREX N	4	
MEAN	.6921	
STD	.8599	
PHOTOMIREX N	4	
MEAN	.2927	
STD	.2567	

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.
LAKE ONTARIO, LESLIE ST. SPIT

HERRING GULL		YEAR	
CIS-NONACHLOR	N	78	88
	MEAN		1
	STD		.0491
TRANS-	N		1
NONACHLOR	MEAN		.0678
	STD		
OCTACHLORO-	N		1
STYRENE	MEAN		.0168
	STD		
PCB 1260	N		1
	MEAN		.411
	STD		13.32
PCB 1254:1260 (conversion to total PCB congener conc see pg. 39)	N	61.87	1
	MEAN	72.27	1
	STD	21.44	20.39

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*
LAKE ONTARIO, TORONTO ISLANDS

		YEAR
COMMON TERN		---
	73	---
PERCENT LIPID IN EGG	MEAN	5.91 ⁶
	STD	.8377
HEXA-CHLOROBENZENE	N	.1467 ⁶
	MEAN	.0954
DDD	N	.1717 ⁶
	MEAN	.1001
DDE	N	5.733 ⁶
	MEAN	2.985
DDT	N	.2794 ⁶
	MEAN	.1460
DIELDRIN	N	0.34 ⁶
	MEAN	.2211
HEPTACHLOR EPOXIDE	N	.0583 ⁶
	MEAN	.0564
TOTAL MERCURY	N	.5617 ⁶
	MEAN	.1579
PCB 1260	N	22.85 ⁶
	MEAN	13.11

*All units measured on wet weight basis.

Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*
LAKE ONTARIO, MUGG'S ISLAND.

HERRING GULL				YEAR											
	74	75	77	78	79	80	81	82	83	84	85	86	87		
PERCENT LIPID IN EGG	9	10	10	4	10	9	10	9	11	10	10	10	10	10	1
MEAN	7.789	7.69	8.79	8.575	8.73	7.856	8.93	8.656	8.491	8.89	9.14	8.1	9		
STD	1.214	.7767	1.039	.4193	.5458	.7955	.7846	1.577	.7286	.8491	.6867	1.182			
ARSENIC	N	10	10	10	10	10	10	10	10	10	10	10	10	10	1
MEAN		.0213													
STD		.0133													
CADMIUM	N	10	10	10	10	10	10	10	10	10	10	10	10	10	1
MEAN		.0057													
STD		.0022													
ALPHA-CHLORDANE	N	9	2	8	9	10	9	10	9	11	10	10	10	10	1
MEAN		.0289	0.125	.1238	.1044	0.193	.0189	0.114	.0135	0.017	.0113	0.006			
STD		.0078	.0495	.035	.0413	.0.057	.0136	.0045	.0.01	.0125	.0055				
GAMMA-CHLORDANE	N	9	9	9	9	9	9	9	9	11	10	10	10	10	1
MEAN		.0094								.0027	.0055	.004	.004	.004	
STD		.0017								.0008	.0016	.0013			
OXY-CHLORDANE	N	9	4	8	9	10	9	10	9	11	10	10	10	10	1
MEAN		.1578	.2025	.0.255	.2467	0.272	.3622	0.17	.0.2	.0.2	.0.169	.1513	0.114		
STD		.0632	.0754	.1732	.1697	.2347	.1431	.0522	.0688	.0522	.0688	.0582	.0325		
1,23-CHLOROBENZENE	N	10	10	10	10	10	10	10	10	10	10	10	10	10	1
MEAN		0.001													
STD		0													
1,24-CHLOROBENZENE	N	10	10	10	10	10	10	10	10	10	10	10	10	10	1
MEAN		.0037													
STD		.0028													
1,35-CHLOROBENZENE	N	10	10	10	10	10	10	10	10	10	10	10	10	10	1
MEAN		0.001													
STD		0													

*All units measured on wet weight basis. Dioxins and furans measured in ug/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*
LAKE ONTARIO, MUGG'S ISLAND

HERRING GULL				YEAR												
	N	MEAN	STD	74	75	77	78	79	80	81	82	83	84	85	86	87
1234- CHLOROBENZENE	N	.0082	.0068	10	9	10	9	11	11	10	10	10	10	10	10	1
	MEAN	0.003	0.003	0.0037	0.009	0.009	0.009	0.0034	0.0033	0.0033	0.0033	0.0033	0.0033	0.0033	0.0033	.0176
	STD															
1235- / 1245- CHLOROBENZENE	N	.0095	0.006	10	9	10	9	11	11	10	10	10	10	10	10	1
	MEAN	.0029	.0037	.0076	.0076	.0033	.0038	.0038	.0038	.0026	.0026	.0026	.0026	.0026	.0026	.0026
	STD															
PENTA- CHLOROBENZENE	N	.0499	0.307	10	9	10	9	11	11	10	10	10	10	10	10	1
	MEAN	.0681	.0242	.0266	.0266	.0099	.0099	.0132	.0132	.0137	.0137	.0118	.0118	.0118	.0118	.0094
	STD															
HEXA- CHLOROBENZENE	N	.6038	1.4484	10	10	4	10	9	10	9	11	10	10	10	10	1
	MEAN	.3559	.3430	2.675	0.206	1.974	2.305	1.551	0.729	0.106	0.582	0.682	0.682	0.682	0.682	.0332
	STD															
DDD	N	.9	1.0	10	10	9	10	9	11	10	10	10	10	10	10	1
	MEAN	.3064	0.007	0.165	0.118	0.14	0.056	1.011	0.182	0.175	0.033	0.159	0.159	0.159	0.159	.0117
	STD															
DDE	N	.9	1.0	10	4	10	9	10	9	11	10	10	10	10	10	1
	MEAN	.23.32	22.02	12.8	11.85	9.046	8.169	10.26	11.47	4.489	5.317	4.897	3.999	3.999	3.999	3.999
	STD															
DDT	N	.9	1.0	10	4	10	9	10	9	11	10	10	10	10	10	1
	MEAN	1.182	1.292	0.118	.1025	0.079	1.044	0.078	1.067	1.068	0.095	0.047	0.049	0.049	0.049	.0202
	STD															
DIELDRIN	N	.9	1.0	10	4	10	9	10	9	11	10	10	10	10	10	1
	MEAN	4.589	0.241	0.276	.2176	0.221	1.789	0.28	.2922	1.436	0.132	0.125	0.1352	0.1352	0.1352	.1147
	STD															
2378- TETRACHLORO- DIBENZO-P- DIOXIN	N															1
	MEAN															1
	STD															45

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.
LAKE ONTARIO, MUGG'S ISLAND

HERRING GULL		YEAR												
		74	75	77	78	79	80	81	82	83	84	85	86	87
12378-	N MEAN STD											1 10	1 5	1 11
PENTACHLORO- DIBENZO-P- DIOXIN														1 5
123678-	N MEAN STD											1 20	1 12	1 7
HEPTACHLORO- DIBENZO-P- DIOXIN														1 9
1234678-	N MEAN STD											1 10	1 6	1 6
HEPTACHLORO- DIBENZO-P- DIOXIN														
OCTACHLORO- DIBENZO-P- DIOXIN	N MEAN STD											1 14	1 10	1 10
2378-	N MEAN STD											1 2	1 ND	1 ND
TETRACHLORO- DIBENZOFURAN														
23478-	N MEAN STD											1 11	1 4	1 6
PENTACHLORO- DIBENZOFURAN														1 5
123478- / 123467- HEPTACHLORO- DIBENZOFURAN	N MEAN STD											1 5	1 4	1 4
123678- HEPTACHLORO- DIBENZOFURAN	N MEAN STD											1 6	1 4	1 4

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*
LAKE ONTARIO, MUGG'S ISLAND

HERRING GULL				YEAR												
	N	MEAN	STD	74	75	77	78	79	80	81	82	83	84	85	86	87
HEPTACHLOR	N	.9	.10	9	4	8	9	10	9	11	10	10	10	10	10	1
EPOXIDE	MEAN	.1389	0.029	0.07	0.085	0.0625	0.095	0.09	0.095	0.0933	0.0409	0.058	0.062	0.0782	.0542	
	STD	.0226	.0129	.0354	.0311	.0128	.0361	.0299	.0287	.0284	.0155	.0132	.0132	.0138		
ALPHA-	N															1
HEXA-CHLORO-	MEAN															.0025
CYCLOHEXANE	STD															
BETA-	N	10	4	10	9	10	9	11	10	10	10	10	10	10	10	1
HEXA-CHLORO-	MEAN	0.084	0.0625	0.046	0.0433	0.048	0.0267	0.0218	0.0218	0.0218	0.02	0.095	0.0119	.0031		
CYCLOHEXANE	STD	.0263	.0126	.0241	.0241	.0225	.0212	.0158	.0158	.0087	.0082	.0016	.0016	.0048		
GAMMA-	N															1
HEXA-CHLORO-	MEAN															.0021
CYCLOHEXANE	STD															
LEAD	N	0.247	.1587													
TOTAL MERCURY	N	4.989	0.775	9	10	10	9	11	11	10	9	10	10	10	10	
	MEAN	0.098	.3724													
	STD															
MIREX	N	7.44	3.421	2.051	4	10	9	10	9	10	9	10	10	10	10	1
	MEAN	4.748	1.424	1.424	1.5148	1.5148	1.8155	1.722	2.534	3.691	1.36	1.722	1.262	.9815	.5024	
	STD															
PHOTOMIREX	N			10	4	10										
	MEAN	0.83	0.495	0.719												
	STD	.2438	.1586	.3318												
CIS-NONACHLOR	N															
	MEAN															
	STD															

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*
LAKE ONTARIO, MUGG'S ISLAND

HERRING GULL				YEAR											
	74	75	77	78	79	80	81	82	83	84	85	86	87		
TRANS-NONACHLOR	N													9	11
	MEAN													.0833	.0273
	STD													.0458	.0174
OCTACHLORO-STYRENE	N													.0054	.0053
	MEAN														.0512
	STD														
PCB 1260	N	9	10	10	4	10	9	10	9	11	10			10	1
	MEAN	125.8	81.99	73.17	64.25	65.4	52.71	64.81	59.14	32.7	40.72			10.21	6.938
	STD	36.12	15.98	18.43	9.533	22.58	25.1	26.9	18.63	13.29	16.93			2.274	
PCB 1254:1260 (conversion congener conc see pg. 39)	N	9	10	10	4	10	9	10	9	11	10			10	1
	MEAN	165.6	106.6	86.62	76.98	76.29	59.69	72.17	64.47	39.01	48.87			36.57	25.04
	STD	47.68	20.79	19.51	14.14	29.74	28.83	29.98	20.47	15.27	20.13			8.623	5.464
SELENIUM	N														
	MEAN														
	STD														

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.
LAKE ONTARIO, MUGG'S ISLAND

COMMON TERN	YEAR
PERCENT LIPID N IN EGG	72
PERCENT LIPID N IN EGG	5 MEAN STD
HEXA- CHLOROBENZENE	N MEAN STD
DDD	N MEAN STD
DDE	N MEAN STD
DDT	N MEAN STD
DIELDRIN	N MEAN STD
HEPTACHLOR EPOXIDE	N MEAN STD
TOTAL MERCURY	N MEAN STD
PCB 1260	N MEAN STD

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*
LAKE ONTARIO, MUGG'S ISLAND

RING-BILLED GULL		YEAR
		79
PERCENT LIPID IN EGG	N MEAN STD	24 9.904 1.095
ALPHA-CHLORDANE	N MEAN STD	14 .0671 .0432
OXY-CHLORDANE	N MEAN STD	24 .0758 .0418
HEXA-CHLOROBENZENE	N MEAN STD	24 .1192 .0466
DDD	N MEAN STD	24 .1104 .0418
DDE	N MEAN STD	24 3.019 1.321
DDT	N MEAN STD	24 .0263 .0134
DIELDRIN	N MEAN STD	24 .5221 .2546
HEPTACHLOR EPOXIDE	N MEAN STD	24 .0804 .0505

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*
LAKE ONTARIO, MUGG'S ISLAND

RING-BILLED GULL		YEAR	
		79	
BETA-	N	24	
HEXACHLORO-	MEAN	.0275	
CYCLOHEXANE	STD	.0107	
MIREX	N	24	
	MEAN	.7471	
	STD	0.408	
PHOTOMIREX	N	24	
	MEAN	.2658	
	STD	.1534	
PCB 1260	N	24	
	MEAN	21.21	
	STD	10	
PCB 1254:1260 (conversion to total PCB congener conc see pg. 39)	N	24	
	MEAN	27.25	
	STD	11.8	

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*
LAKE ONTARIO, HAMILTON HARBOUR

HERRING GULL		YEAR				
		81	82	84	86	87
PERCENT LIPID IN EGG	N MEAN STD	10 9.77 .7304	1 8.7	1 8.7	1 6.8	1 9.2
ALPHA-CHLORDANE	N MEAN STD	10 0.335 .0768	1 0.02	1 0.02	1 0.013	1 .0121
GAMMA-CHLORDANE	N MEAN STD	7 0.0829 0.015	1 0.01	1 0.05	1 .0016	1
OXY-CHLORDANE	N MEAN STD	10 0.329 .2156	1 0.3	1 0.18	1 0.146	1 .1012
1,234-CHLOROBENZENE	N MEAN STD	10 0.059 .0014	1 0.003	1 0.022	1 .0176	1
1,235-/ 1,245-CHLOROBENZENE	N MEAN STD	10 0.046 .0044	1 0.006	1 0.004	1 .0266	1
PENTA-CHLOROBENZENE	N MEAN STD	10 0.0248 .0062	1 0.017	1 0.012	1 .0097	1
HEXA-CHLOROBENZENE	N MEAN STD	10 0.2255 .0716	1 0.126	1 0.065	1 0.042	1 .0438
DDD	N MEAN STD	10 0.102 .0286	1 0.09	1 0.02	1 0.033	1 .0139

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*
LAKE ONTARIO, HAMILTON HARBOUR

HERRING GULL				YEAR			
	N	MEAN	STD	81	82	84	86
DDE	N	10	1	1	1	1	1
	MEAN	11.1	4.76	5.12	4.08	2.409	
	STD	3.947					
DDT	N	10	1	1	1	1	1
	MEAN	0.114	0.09	0.02	0.357	0.339	
	STD	.0267					
DIELDRIN	N	10	1	1	1	1	1
	MEAN	0.264	0.2	0.2	0.171	0.1139	
	STD	.0638					
2378-TETRACHLORO-DIBENZO-P-DIOXIN	N	50	1	1	1	1	1
	MEAN						
	STD						
12378-PENTACHLORO-DIBENZO-P-DIOXIN	N	9	1	8	1	7	
	MEAN						
	STD						
123678-HEXAACHLORO-DIBENZO-P-DIOXIN	N	15	1	1	1	1	
	MEAN						
	STD						
1234678-HEPTACHLORO-DIBENZO-P-DIOXIN	N	6	1	1	1	1	
	MEAN						
	STD						
OCTACHLORO-DIBENZO-P-DIOXIN	N	12	1	10	1	10	
	MEAN						
	STD						
2378-TETRACHLORO-DIBENZOFURAN	N	2	1	ND	1	ND	
	MEAN						
	STD						

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.
LAKE ONTARIO, HAMILTON HARBOUR

HERRING GULL		YEAR				
		81	82	84	86	87
23478-	N			1	1	1
PENTACHLORO-	MEAN			10	7	7
DIBENZOFURAN	STD					
123478- /	N					
123467-	MEAN					
HEXYACHLORO-	STD					
DIBENZOFURAN						
123678-	N					
HEXYACHLORO-	MEAN					
DIBENZOFURAN	STD					
HEPTACHLOR	N					
EPOXIDE	MEAN					
	STD					
ALPHA-	N					
HEXYACHLORO-	MEAN					
CYCLOHEXANE	STD					
BETA-	N					
HEXYACHLORO-	MEAN					
CYCLOHEXANE	STD					
GAMMA-	N					
HEXYACHLORO-	MEAN					
CYCLOHEXANE	STD					
TOTAL MERCURY	N					
	MEAN					
	STD					
MIREX	N					
	MEAN					
	STD					

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*
LAKE ONTARIO, HAMILTON HARBOUR

HERRING GULL			YEAR		
	N		81	82	84
PHOTOMIREX	MEAN				
	STD				
CIS-NONACHLOR	N	MEAN			
	STD				
TRANS-	N	MEAN			
-NONACHLOR	STD				
OCTACHLORO-	N	MEAN			
STYRENE	STD				
PCB 1260	N	MEAN			
	STD				
PCB 1254:1260 (conversion to total PCB congener conc see pg. 39)	N	MEAN			
	STD				

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*
LAKE ONTARIO, HAMILTON HARBOUR

COMMON TERN	YEAR
PERCENT LIPID IN EGG	71
N	25
MEAN	7.448
STD	4.382
HEXA-CHLOROBENZENE	25
N	.9512
MEAN	.5752
DDD	N
MEAN	0.582
STD	.4334
DDE	N
MEAN	16.84
STD	8.587
DDT	N
MEAN	25
STD	.3083
DIELDRIN	N
MEAN	25
STD	.3226
HEPTACHLOR EPOXIDE	N
MEAN	.5476
STD	.2455
TOTAL MERCURY	N
MEAN	25
STD	.1.12
PCB 1260	N
MEAN	25
STD	.3746
	96.67
	33.85

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*
LAKE ONTARIO, HAMILTON HARBOUR

RING-BILLED GULL		YEAR
		84
PERCENT LIPID IN EGG	MEAN STD	10 8.74 .8682
ALPHA-CHLORDANE	N MEAN STD	10 0.061 .0929
GAMMA-CHLORDANE	N MEAN STD	10 .0287 .0646
OXY-CHLORDANE	N MEAN STD	10 0.095 0.045
1,234-CHLOROBENZENE	N MEAN STD	10 .0005 0
1,235-/ 1,245-CHLOROBENZENE	N MEAN STD	10 .0005 0
PENTA-CHLOROBENZENE	N MEAN STD	10 .0008 .0006
HEXA-CHLOROBENZENE	N MEAN STD	10 .0436 .0526
DDD	N MEAN STD	10 0.031 .0237

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g. 1-63

TABLE 11. Contaminant data, summarized by Location.
LAKE ONTARIO, HAMILTON HARBOUR

	RING-BILLED GULL	YEAR
DDE	N MEAN STD	10 3.222 2.714
DDT	N MEAN STD	10 .0325 .0321
DIELDRIN	N MEAN STD	10 0.409 .2563
HEPTACHLOR EPOXIDE	N MEAN STD	10 0.107 .0492
ALPHA- HEXACHLORO- CYCLOHEXANE	N MEAN STD	10 .0025 0
BETA- HEXACHLORO- CYCLOHEXANE	N MEAN STD	10 0.004 .0013
MIREX	N MEAN STD	10 0.504 .1812
TRANS- NONACHLOR	N MEAN STD	10 0.04 .0294
PCB 1260	N MEAN STD	10 15.19 10.8

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*
LAKE ONTARIO, HAMILTON HARBOUR

RING-BILLED GULL	YEAR
	84
PCB 1254:1260 (conversion to total PCB congener conc see pg. 39)	N MEAN STD
	10 18.78 13.36

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*
NIAGARA RIVER

HERRING GULL		YEAR									
		79	81	82	83	84	85	86	87	88	
PERCENT LIPID	N IN EGG	10 .5051	10 9.58 .6925	1 8.8 .4435	11 9.56 1.502	10 9.19 .7937	10 8.39 .5021	10 8.9 8.1	10 8.9 7.8	10 8.9 7.8	1
ALPHA-CHLORDANE	N MEAN STD	0.118 .0464	0.178 .0547	0.02 .0086	0.0175 .0071	0.015 .0067	0.013 .0041	0.013 .0041	0.01 .0074	0.01 .0246	1
GAMMA-CHLORDANE	N MEAN STD	5 .0104	1 0.01	11 .0036	10 .0065	10 .0055	10 .0016	10 .0016	1 .0016	1 .0013	1
OXY-CHLORDANE	N MEAN STD	0.125 .0372	0.17 .0829	0.15 .0631	0.2 .0853	0.2 .0403	0.185 .0397	0.13 .1018	0.1382 .1018	0.1 .0014	1
135-CHLOROBENZENE	N MEAN STD	10 0.001	10 0.001	10 0.001	10 0.001	10 0.001	10 0.001	10 0.001	10 0.001	10 0.001	1
124-CHLOROBENZENE	N MEAN STD	10 .0212	10 .0236	10 .0063	10 .0062	10 .0024	10 .0106	10 .0078	10 .0118	10 .0094	.0176
123-CHLOROBENZENE	N MEAN STD	10 .063	10 .062	10 .0043	10 .0043	10 .0102	10 .0192	10 .0065	10 .0214	10 .0103	.0097
1234-CHLOROBENZENE	N MEAN STD	10 .0527	10 .0791	10 .0434 .0734	10 .01 .0024	10 .0118 .0106	10 .0094 .0078	10 .0094 .0078	10 .0118 .0106	10 .0094 .0078	.0175
PENTA-CHLOROBENZENE	N MEAN STD	10 .0471	10 .0453	10 .0538 .0853	10 .02 .0043	10 .0102 .0192	10 .0103 .0065	10 .0103 .0065	10 .0103 .0065	10 .0103 .0065	.0103
1235 / 1245-CHLOROBENZENE	N MEAN STD	10 .0201	10 .0181	10 .0019 .0.021	10 .0029 .0.025	10 .0061 .0.043	10 .0034 .0.042	10 .0034 .0.042	10 .0266 .0.0237	10 .0266 .0.0237	1

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*
NIAGARA RIVER

HERRING GULL				YEAR								
	N	MEAN	STD	79	81	82	83	84	85	86	87	88
HEXA-CHLOROBENZENE	10 N MEAN STD	0.173 .0514	.1318 .0864	10 0.117 0.02	10 0.068 .0218	11 0.093 0.009	10 0.0532 0.028	10 0.0569 0.014	10 0.0162 .0027	10 0.0162 .0027	1 .0311 .0121	1 .0374
DDD	N MEAN STD	0.137 .0313	0.059 0.036	10 4.005 1.334	10 5.677 2.642	11 3.65 1.143	10 3.868 1.081	10 3.348 1.09	10 4.12 1.09	10 2.727 1.016	1 1.51 1.016	1 1.69
DDE	N MEAN STD	0.055 .0366	0.055 0.0334	10 0.05 0.06	10 0.05 0.06	11 0.01 0.01	10 0.01 0.041	10 0.029 0.0099	10 0.0174 .0098	10 0.0277 .0122	1 1.0277	1 1.69
DDT	N MEAN STD	0.201 .0769	0.238 0.1485	10 0.15	10 0.15	11 0.22 0.05	10 0.271 0.2146	10 0.195 0.0515	10 0.1688 .0728	10 0.1427 .1732	1 1.1732	1 1.69
DIELDRIN	N MEAN STD	1 0.769	1 0.1485	1 0.15	1 0.15	11 0.22 0.05	10 0.271 0.2146	10 0.195 0.0515	10 0.1688 .0728	10 0.1427 .1732	1 1.1732	1 1.69
2378-TETRACHLORO-DIBENZO-P-DIOXIN	N MEAN STD	1 1.2	1 1.0	1 1.0	1 1.0	1 1.5	1 1.4	1 1.2	1 1.0	1 1.0	1 1.0	1 1.0
12378-PENTACHLORO-DIBENZO-P-DIOXIN	N MEAN STD	1 1.2	1 1.0	1 1.0	1 1.0	1 1.5	1 1.4	1 1.2	1 1.0	1 1.0	1 1.0	1 1.0
123678-HEXACHLORO-DIBENZO-P-DIOXIN	N MEAN STD	1 2.2	1 1.4	1 1.4	1 1.4	1 1.5	1 1.5	1 1.1	1 1.1	1 1.0	1 1.0	1 1.0
1234678-HEPTACHLORO-DIBENZO-P-DIOXIN	N MEAN STD	1 8	1 8	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*

NIAGARA RIVER

		YEAR								
		79	81	82	83	84	85	86	87	88
HERRING GULL		1	1	1	1	1	1	1	1	1
OCTACHLORO-	N	1	1	1	1	1	1	ND	ND	ND
DIBENZO-P-	MEAN	10	10	10	6	10	10	10	10	10
DIOXIN	STD									
2378-	N									
TETRACHLORO-	MEAN									
DIBENZOFURAN	STD									
23478-	N									
PENTACHLORO-	MEAN									
DIBENZOFURAN	STD									
123478- /	N									
123467-	MEAN									
HEXAACHLORO-	STD									
DIBENZOFURAN										
123678-	N									
HEXAACHLORO-	MEAN									
DIBENZOFURAN	STD									
HEPTACHLOR	N	10	10	1	10	10	10	10	10	10
EPOXIDE	MEAN	0.09	0.106	0.12	0.1582	0.097	0.075	0.0906	0.0719	0.0706
	STD	0.017	0.0327	0.059	0.0383	0.0172	0.0273			
ALPHA-	N									
HEXAACHLORO-	MEAN									
CYCLOHEXANE	STD									
BETA-	N									
HEXAACHLORO-	MEAN									
CYCLOHEXANE	STD									
GAMMA-	N									
HEXAACHLORO-	MEAN									
CYCLOHEXANE	STD									

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*
NIAGARA RIVER

HERRING GULL		YEAR								
		79	81	82	83	84	85	86	87	88
TOTAL MERCURY	N	10	1	11	1	8	1	10	1	1
MEAN		0.236	0.35	0.15	1	0.568	0.587	0.364	1	1
STD		.0819	.0407	.0636		.1335	.1366	.2377	.2107	
MIREX	N	10	10	1	8	10	10	10	1	1
MEAN		0.493	0.738	0.98	.3338	0.568	0.587	0.364	1	1
STD		.2432	.4982	.2576	.1989	.3135	.1366	.2377	.2107	
PHOTOMIREX	N	10	1	1	1	1	1	1	1	1
MEAN		0.175	0.0945	.0945	.0945	.0945	.0945	.0945	.0945	
CIS-NONACHLOR	N	10	1	1	1	1	1	1	1	1
MEAN		0.058	.0331	.0331	.0331	.0331	.0331	.0331	.0331	
STD		.0185	.0185	.0185	.0185	.0185	.0185	.0185	.0185	
TRANS-	N	10	1	1	1	1	1	1	1	1
NONACHLOR	MEAN	0.04	.0164	.025	.025	.025	.025	.025	.025	
STD		.0081	.0108	.0108	.0108	.0108	.0108	.0108	.0108	
OCTACHLORO-	N	10	1	1	1	1	1	1	1	1
STYRENE	MEAN	0.04	.0164	.025	.025	.025	.025	.025	.025	
STD		.0037	.0037	.0037	.0037	.0037	.0037	.0037	.0037	
PCB 1260	N	10	1	1	1	1	1	1	1	1
MEAN		44.14	44.23	38.8	28.12	30.74	30.74	30.74	30.74	
STD		18.24	23.55	17.44	12.38	5.316	5.316	5.316	5.316	
PCB 1254;1260	N	10	1	1	1	1	1	1	1	1
(conversion	MEAN	50.47	50.35	45.5	34.06	37.27	37.27	37.27	37.27	
to total PCB	STD	22.51	25.1	20.37	14.52	11.02	11.02	11.02	11.02	
congener conc										
see pg. 39)										

*All units measured on wet weight basis. Dioxins and furans measured in ug/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*
NIAGARA RIVER

BLACK-CROWNED NIGHT-HERON		YEAR	
PERCENT LIPID IN EGG	N	82	86
	MEAN	1 5.6	1 5.5
	STD		
ALPHA-CHLORDANE	N	0.01	0.026
	MEAN	1	1
	STD		
OXY-CHLORDANE	N	0.14	0.127
	MEAN	1	1
	STD		
1,2,3,4-CHLOROBENZENE	N	0.01	
	MEAN	1	
	STD		
1,2,3,5-/ 1,2,4,5-CHLOROBENZENE	N	0.006	
	MEAN	1	
	STD		
PENTA-CHLOROBENZENE	N	0.013	
	MEAN	1	
	STD		
HEXA-CHLOROBENZENE	N	0.061	0.055
	MEAN	1	1
	STD		
DDD	N	0.08	0.095
	MEAN	1	1
	STD		
DDE	N	4.81	3.27
	MEAN	1	1
	STD		

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.
NIAGARA RIVER

BLACK-CROWNED NIGHT-HERON		YEAR	
DDT	N MEAN STD	82 0.11 0.079	86 1 0.11
DIELDRIN	N MEAN STD	1 0.31 0.218	1 0.06 0.068
HEPTACHLOR EPOXIDE	N MEAN STD	1 0.06 0.068	1 0.01 0.01
ALPHA- HEXACHLORO- CYCLOHEXANE	N MEAN STD	1 0.35 0.099	1 0.75 0.903
BETA- HEXACHLORO- CYCLOHEXANE	N MEAN STD	1 0.35 0.099	1 0.11 0.11
MIREX	N MEAN STD	1 0.75 0.903	1 0.362 0.362
CIS-NONACHLOR	N MEAN STD	1 0.11 0.11	1 0.07 0.258
PHOTOMIREX	N MEAN STD	1 0.362 0.362	1 0.07 0.258
TRANS- NONACHLOR	N MEAN STD	1 0.07 0.258	1 0.07 0.258

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g. 1-71

TABLE 11. Contaminant data, summarized by Location.*

NIAGARA RIVER

BLACK-CROWNED NIGHT-HERON		YEAR	
		82	86
PCB 1260	N	1	1
	MEAN	17.4	14.3
	STD		
PCB 1254:1260 (conversion to total PCB congener conc see pg. 39)	N	18.9	33.4
	MEAN		
	STD		

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*
LAKE ERIE, PORT COLBOURNE, CANADA FURNACE

	COMMON TERN	YEAR
PERCENT LIPID IN EGG	N MEAN STD	6 8.233 .5086
HEXA-CHLOROBENZENE	N MEAN STD	6 0.04 0.011
DDD	N MEAN STD	6 0.115 .0513
DDE	N MEAN STD	6 2.662 1.027
DDT	N MEAN STD	6 .0484 .0261
DIELDRIN	N MEAN STD	6 0.235 .1131
HEPTACHLOR EPOXIDE	N MEAN STD	6 .0383 .0172
TOTAL MERCURY	N MEAN STD	6 .5533 .2303
PCB 1260	N MEAN STD	6 16.08 2.487

*All units measured on wet weight basis.

Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.
LAKE ERIE, PORT COLBORNE LIGHTHOUSE

		YEAR													
HERRING GULL		74	75	77	78	79	80	81	82	83	84	85	86	87	88
PERCENT LIPID	N	10	10	10	9	10	9	10	1	11	10	10	1	10	1
IN EGG	MEAN	8.5	8.21	9.84	8.95	8.59	7.611	9.63	10.6	8.273	9.52	9.17	7.6	9.64	1
	STD	1.05	.6471	1.636	.9664	.4771	.4676	1.008		.9056	1.409	.6056		1.284	8
ARSENIC	N														
	MEAN														
	STD														
CADMIUM	N	1													
	MEAN	0.011													
	STD														
ALPHA-CHLORDANE	N	10	9	10	9	11	10	11	10	10	10	10	1	10	1
	MEAN	0.02	0.123	0.11	0.291	0.03	0.0109	0.021	0.022	0.009	0.0122	0.0077		.0122	.0122
	STD	.0047	.0254	.0415	.0987		.0003	.0057		.0063					
GAMMA-CHLORDANE	N														
	MEAN														
	STD														
OXY-CHLORDANE	N	10	9	10	9	11	10	11	10	10	10	10	1	10	1
	MEAN	13.80	0.122	0.099	0.1167	0.131	0.34	0.1573	0.226	0.17	0.15	0.15		.0998	.1084
	STD	.1169	.0322	.0378	.0666	.0398		.0771	.1361	.0963					
123-CHLOROBENZENE	N														
	MEAN														
	STD														
124-CHLOROBENZENE	N														
	MEAN														
	STD														
135-CHLOROBENZENE	N														
	MEAN														
	STD														

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g. 1-74

TABLE 11. Contaminant data, summarized by Location.
LAKE ERIE, PORT COLBORNE LIGHTHOUSE

HERRING GULL				YEAR													
				74	75	77	78	79	80	81	82	83	84	85	86	87	88
1234-	N	CHLOROBENZENE	MEAN														
	STD																
1235- / 1245-	N	CHLOROBENZENE	MEAN														
	STD																
PENTA-	N	CHLOROBENZENE	MEAN														
	STD																
HEXA-	N	CHLOROBENZENE	MEAN														
	STD																
DDD	N	MEAN															
	STD																
DDE	N	MEAN															
	STD																
DDT	N	MEAN															
	STD																
DIELDRIN	N	MEAN															
	STD																
2378-	N	TETRACHLORO-															
	STD	DIBENZO-P-															
		DIOXIN															

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g. 1-75

TABLE 11. Contaminant data, summarized by Location.*
LAKE ERIE, PORT COLBORNE LIGHTHOUSE

HERRING GULL		YEAR													
		74	75	77	78	79	80	81	82	83	84	85	86	87	88
123478-	N														
PENTACHLORO-	MEAN														
DIBENZO-P-	STD														
DIOXIN															
1234678-	N														
HEPTACHLORO-	MEAN														
DIBENZO-P-	STD														
DIOXIN															
1234678-	N														
HEPTACHLORO-	MEAN														
DIBENZO-P-	STD														
DIOXIN															
OCTACHLORO-	N														
DIBENZO-P-	MEAN														
DIOXIN	STD														
2378-	N														
TETRACHLORO-	MEAN														
DIBENZOFURAN	STD														
23478-	N														
PENTACHLORO-	MEAN														
DIBENZOFURAN	STD														
123478-/	N														
123467-	MEAN														
HEPTACHLORO-	STD														
DIBENZOFURAN															
1234678-	N														
HEPTACHLORO-	MEAN														
DIBENZOFURAN	STD														
HEPTACHLOR	N														
EPOXIDE	MEAN														
	STD														

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g. 1-76

TABLE 11. Contaminant data, summarized by Location.*
LAKE ERIE, PORT COLBORNE LIGHTHOUSE

HERRING GULL		YEAR													
		74	75	77	78	79	80	81	82	83	84	85	86	87	88
ALPHA-HEXACHLOROCYCLOHEXANE	N MEAN STD											0.1 0.01 0.002	11 0.091 .0045	10 0.055 .0011	10 .0016 0
BETA-HEXACHLOROCYCLOHEXANE	N MEAN STD											0.1 0.03 .0105	11 0.017 .0067	10 0.01 0	10 .0005 0
GAMMA-HEXACHLOROCYCLOHEXANE	N MEAN STD														
LEAD	N MEAN STD														
TOTAL MERCURY	N MEAN STD	10 0.211 .0363	10 0.268 .0466									10 0.244 .0762	11 0.54 0.081	10 0.2209 .1147	10 0.298 0
MIREX	N MEAN STD	10 0.844 .5057	10 0.419 .1658	10 0.511 .1981	10 0.379 .1569	9 0.245 .0902	9 0.2844 .1826	10 0.424 .4674	11 0.424 .2333	10 0.382 .2524	10 0.235 .0789	10 0.25 .0789	10 0.1698 0	10 0.2123 0	10 0.1814 0
CIS-NONACHLOROPHOTOMIREX	N MEAN STD														
TRANS-NONACHLOROPHOTOMIREX	N MEAN STD														

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g. 1-77

TABLE 11. Contaminant data, summarized by Location.
LAKE ERIE, PORT COLBORNE LIGHTHOUSE

HERRING GULL			YEAR											
	74	75	77	78	79	80	81	82	83	84	85	86	87	88
OCTACHLORO-STYRENE	N MEAN STD													
PCB 1260	N MEAN STD	10 55.1 14.79	10 41.46 10.43	10 50.01 9.263	10 38.31 4.578	9 31.09 12.74	10 32.91 11.76	9 39.79 11.76	10 50.7 18.38	11 30.79 12.93	10 38.79 12.93			
PCB 1254:1260 (conversion to total PCB congener conc see pg. 39)	N MEAN STD	10 72.56 19.52	10 53.91 13.52	10 59.27 12.73	10 46.43 10.81	10 37.59 6.216	9 37.59 15.75	10 44.36 12.88	9 54.36 21.37	11 59.7 14.66	10 45.13 12.81	10 29.66 12.81	10 23.7 14.66	
SELENIUM	N MEAN STD													

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*
LAKE ERIE, PORT COLBORNE LIGHTHOUSE

COMMON TERN		YEAR	
PERCENT LIPID IN EGG	N	72	73
	MEAN	8.175	2
	STD	.8261	.5657
HEXA-CHLOROBENZENE	N	4	2
	MEAN	.0825	0.05
	STD	.0457	0
DDD	N	4	2
	MEAN	.1475	0.13
	STD	0.033	0
DDE	N	4	2
	MEAN	6.42	3.535
	STD	1.786	1.959
DDT	N	4	2
	MEAN	.0011	.0894
	STD	0	.0316
DIELDRIN	N	4	2
	MEAN	.2625	0.25
	STD	.0665	.0707
HEPTACHLOR EPOXIDE	N	4	2
	MEAN	.0525	0.04
	STD	.0206	.0141
TOTAL MERCURY	N	4	2
	MEAN	0.56	0.495
	STD	.2165	.1061
PCB 1260	N	4	2
	MEAN	45.6	20.75
	STD	14.94	7.849

*All units measured on wet weight basis. Dioxins and furans measured in ug/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*
LAKE ERIE, MOHAWK ISLAND

HERRING GULL	YEAR
PERCENT LIPID IN EGG	78
N MEAN	10 9.67
STD	.9684
OXY-CHLORDANE	N MEAN STD
	0.158 .1186
HEXA-CHLOROBENZENE	N MEAN STD
	0.116 .0425
DDE	N MEAN STD
	4.445 1.195
DDT	N MEAN STD
	0.044 .0126
DIELDRIN	N MEAN STD
	0.322 .2443
HEPTACHLOR EPOXIDE	N MEAN STD
	0.112 .0471
BETA-HEXACHLORO-CYCLOHEXANE	N MEAN STD
	0.0255 .0164
MIREX	N MEAN STD
	0.258 .1497

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*
LAKE ERIE, MOHAWK ISLAND

HERRING GULL		YEAR	
		78	
PHOTOMIREX	N MEAN STD	10 0.092 .0473	
PCB 1260	N MEAN STD	10 29.69 6.957	
PCB 1254:1260 (conversion to total PCB congener conc see pg. 39)	N MEAN STD	10 34.74 7.908	

*All units measured on wet weight basis.

Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.
LAKE ERIE, LONG POINT PROVINCIAL PARK

FORSTERS TERN	YEAR
PERCENT LIPID N IN EGG	86
MEAN	1
STD	7.3
ALPHA- CHLORDANE	N MEAN STD
	0.025
OXY- CHLORDANE	N MEAN STD
	0.038
HEXA- CHLOROBENZENE	N MEAN STD
	0.017
DDD	N MEAN STD
	.0005
DDE	N MEAN STD
	1.21
DDT	N MEAN STD
	0.03
DIELDRIN	N MEAN STD
	0.127
HEPTACHLOR EPOXIDE	N MEAN STD
	0.039

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g. 1-82

TABLE 11. Contaminant data, summarized by Location.
LAKE ERIE, LONG POINT PROVINCIAL PARK

FORSTERS TERN		YEAR
		86
BETA-HEXACHLOROCYCLOHEXANE	N MEAN STD	1 .0005
MIREX	N MEAN STD	1 0.025
CIS-NONACHLOR	N MEAN STD	1 0.072
PHOTOMIREX	N MEAN STD	1 .0005
TRANS-NONACHLOR	N MEAN STD	1 0.22
PCB 1260	N MEAN STD	1 4.65
PCB 1254;1260 (conversion to total PCB congener conc see pg. 39)	N MEAN STD	1 11.4

*All units measured on wet weight basis.

Dioxins and furans measured in pg/g; all others measured in ug/g.

1-83

TABLE 11. Contaminant data, summarized by Location.*
LAKE ERIE, SANDUSKY TURNING POINT

HERRING GULL	YEAR
PERCENT LIPID IN EGG	79
MEAN	10 9.36
STD	.7321
ALPHA-CHLORDANE	N MEAN STD
OXY-CHLORDANE	N MEAN STD
123-CHLOROBENZENE	N MEAN STD
124-CHLOROBENZENE	N MEAN STD
135-CHLOROBENZENE	N MEAN STD
1234-CHLOROBENZENE	N MEAN STD
1235-/ 1245-CHLOROBENZENE	N MEAN STD
PENTA-CHLOROBENZENE	N MEAN STD

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*
LAKE ERIE, SANDUSKY TURNING POINT

		YEAR
HERRING GULL		
HEXA-	N	79
CHLOROBENZENE	MEAN	0.102
	STD	.0352
DDD	N	10
	MEAN	0.096
	STD	.0409
DDE	N	10
	MEAN	2.981
	STD	1.525
DDT	N	10
	MEAN	0.035
	STD	.0108
DIELDRIN	N	10
	MEAN	0.274
	STD	.1226
HEPTACHLOR	N	9
EPOXIDE	MEAN	.1344
	STD	.0513
BETA-	N	10
HEXA-CHLORO-	MEAN	0.015
CYCLOHEXANE	STD	.0071
MIREX	N	10
	MEAN	0.2
	STD	.2308
PHOTOMIREX	N	10
	MEAN	0.074
	STD	.0828

*All units measured on wet weight basis.

Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.
LAKE ERIE, SANDUSKY TURNING POINT

HERRING GULL	YEAR
	79
PCB 1260	N MEAN STD
	10 46.32 10.3
PCB 1254;1260 (conversion to total PCB congener conc see pg. 39)	N MEAN STD
	10 51.54 11.45

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g. 1-86

TABLE 11. Contaminant data, summarized by Location.*
LAKE ERIE, MIDDLE ISLAND

HERRING GULL				YEAR											
	74	75	77	78	79	80	81	82	83	84	85	86	87	88	
PERCENT LIPID	10	10	10	10	10	10	10	10	10	10	10	10	10	10	
IN EGG	8.49	8.44	9	8.8	8.12	7.07	8.64	7.94	7.77	9.12	9.04	7.7	8.72	7.3	
MEAN	0.853	.8488	1.076	1.143	1.057	.9945	.8631	1.303	.5293	1.209	.8733				
STD															1.214
ARSENIC	N	1													
	MEAN	0.015													
	STD														
CADMIUM	N	1													
	MEAN	0.011													
	STD														
ALPHA-CHLORDANE	N	10	10	10	10	10	10	10	10	10	10	10	10	10	
	MEAN	0.162	0.08	0.239	0.023	0.013	0.016	0.0155	0.016	0.0155	0.016	0.016	0.016	0.016	
	STD	0.041	0.0236	0.0755	.0082	.0048	0.0076								
GAMMA-CHLORDANE	N	10	10	10	10	10	10	10	10	10	10	10	10	10	
	MEAN	0.017	0.0117	0.0117											
	STD														
OXY-CHLORDANE	N	10	10	10	10	10	10	10	10	10	10	10	10	10	
	MEAN	0.105	0.105	0.118	0.098	0.153	0.133	0.171	0.152	0.172	0.0962	0.1275			
	STD	.0517	.0682	.0391	.0301	.0631	.0512	.0615	.0385						
123-CHLOROBENZENE	N	10													
	MEAN	.022													
	STD	.0033													
124-CHLOROBENZENE	N	10													
	MEAN	.0063													
	STD	.0037													
135-CHLOROBENZENE	N	10													
	MEAN	0													
	STD	0													

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g. 1-87

TABLE 11. Contaminant data, summarized by Location.*
LAKE ERIE, MIDDLE ISLAND

		YEAR													
HERRING GULL		74	75	77	78	79	80	81	82	83	84	85	86	87	88
1234-	N														
CHLOROBENZENE	MEAN														
	STD														
1235- / 1245-	N														
CHLOROBENZENE	MEAN														
	STD														
PENTA-	N														
CHLOROBENZENE	MEAN														
	STD														
HEXA-	N														
CHLOROBENZENE	MEAN														
	STD														
DDD	N														
	MEAN														
	STD														
DDE	N														
	MEAN														
	STD														
DDT	N														
	MEAN														
	STD														
DIELDRIN	N														
	MEAN														
	STD														
2378-	N														
TETRACHLORO-	MEAN														
DIBENZO-P-	STD														
DIOXIN															

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*
LAKE ERIE, MIDDLE ISLAND

HERRING GULL		YEAR													
		74	75	77	78	79	80	81	82	83	84	85	86	87	88
12378-	N														
PENTACHLORO-	MEAN														
DIBENZO-P-	STD														
DIOXIN															
123678-	N														
HEXAChLORO-	MEAN														
DIBENZO-P-	STD														
DIOXIN															
1234678-	N														
HEPTACHLORO-	MEAN														
DIBENZO-P-	STD														
DIOXIN															
OCTACHLORO-	N														
DIBENZO-P-	MEAN														
DIOXIN	STD														
2378-	N														
TETRACHLORO-	MEAN														
DIBENZOFURAN	STD														
23478-	N														
PENTACHLORO-	MEAN														
DIBENZOFURAN	STD														
123478-/	N														
123467-	MEAN														
HEXAChLORO-	STD														
DIBENZOFURAN															
123678-	N														
HEXAChLORO-	MEAN														
DIBENZOFURAN	STD														
HEPTACHLOR	N														
EPOXIDE	MEAN														
	STD														

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g. 1-89

TABLE 11. Contaminant data, summarized by Location.*
LAKE ERIE, MIDDLE ISLAND

HERRING GULL		YEAR																
		74	75	77	78	79	80	81	82	83	84	85	86	87	88			
ALPHA-HEXACHLOROCYCLOHEXANE	N MEAN STD											10 0.007 .0026	10 .0025 0	10 .0047 0	10 .0008 0	10 .0021 .0003	1 .0026	
BETA-HEXACHLOROCYCLOHEXANE	N MEAN STD											10 0.01 0.004	10 .0029 0.007	10 .016 0.0059	10 .0106 .0016	10 .0025 .0016	10 .0005 0	1 .0031 0
GAMMA-HEXACHLOROCYCLOHEXANE	N MEAN STD															1 .0032		
LEAD	N MEAN STD															0 .0002 0		
TOTAL MERCURY	N MEAN STD	10 0.223 .0648	10 0.214 .0769									10 0.165 .0255	10 0.211 .0418	10 0.134 .028	10 .0324 .	10 .156 .0324	1 .0258	
MIREX	N MEAN STD	10 0.436 .4288	10 0.223 .0627	10 0.39 .3441	10 0.192 .0495	10 0.104 .0409	10 0.093 .0794	10 0.073 .0732	10 0.079 .0363	10 0.043 .0406	10 0.046 .0447	10 0.05 .0215	10 0.052 .0447	10 0.05 .0215	10 0.03 .0215	10 .056 .0215	1 .042 .0258	
PHOTOMIREX	N MEAN STD															1 .0005 .		
CIS-NONACHLOR	N MEAN STD															1 .056 .0087		
TRANS-NONACHLOR	N MEAN STD															1 .0338 .0263		

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g. 1-90

TABLE 11. Contaminant data, summarized by Location.
LAKE ERIE, MIDDLE ISLAND

HERRING GULL			YEAR											
	74	75	77	78	79	80	81	82	83	84	85	86	87	88
OCTACHLOROSTYRENE	N MEAN STD													
PCB 1260	N MEAN STD	10 55.04 10.49	10 69.51 23.73	10 34.38 9.215	10 53.45 11.54	10 47.65 10.62	10 61.56 14.59	10 50.39 20.86	10 30.91 13.44	10 40.41 13.4	10 22.7 13.4	10 22.7 13.4	10 15.85 4.456	10 17.2
PCB 1254:1260 (conversion to total PCB congener conc see pg. 39)	N MEAN STD	10 72.36 13.79	10 70.69 13.37	10 78.13 23.96	10 42.43 11.31	10 59.28 12.77	10 54.29 11.56	10 68.61 15.74	10 58.81 23.88	10 37.92 15.41	10 47.26 15.85	10 47.15 10.46	10 47.15 10.46	10 27.88 6.278
SELENIUM	N MEAN STD													

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*
LAKE ERIE, MIDDLE ISLAND

BLACK-CROWNED NIGHT-HERON		YEAR	
PERCENT LIPID IN EGG	N	82	86
	MEAN	10	1
	STD	5.67	5.1
		1.076	
ALPHA-CHLORDANE	N	.0135	.01
	MEAN	.0048	
	STD	.0036	
GAMMA-CHLORDANE	N	.0123	.035
	MEAN	.1141	
OXY-CHLORDANE	N	.0003	0
	MEAN	.0003	
1,234-CHLOROBENZENE	N	.0003	0
	MEAN	.0003	
1,235-/ 1,245-CHLOROBENZENE	N	.10	0
	MEAN	.0003	
PENTA-CHLOROBENZENE	N	.0012	
	MEAN	.0012	
HEXA-CHLOROBENZENE	N	.0278	.0006
	MEAN	.0169	
DDD	N	.054	.016
	MEAN	.0135	
	STD		

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g. 1-92

TABLE 11. Contaminant data, summarized by Location.*
LAKE ERIE, MIDDLE ISLAND

	BLACK-CROWNED NIGHT-HERON		YEAR
	82	86	
DDE	N MEAN STD	10 1.736 .8802	1 0.763
DDT	N MEAN STD	10 .0025 0	1 .0005
DIELDRIN	N MEAN STD	10 0.111 .0901	1 0.034
HEPTACHLOR EPOXIDE	N MEAN STD	10 0.039 .0208	1 0.021
ALPHA- HEXACHLORO- CYCLOHEXANE	N MEAN STD	10 .0025 .	1 .
BETA- HEXACHLORO- CYCLOHEXANE	N MEAN STD	10 .0043 .0055	1 .0005
MIREX	N MEAN STD	10 0.028 .0114	1 0.011
PHOTOMIREX	N MEAN STD	1 .	1 .0005
CIS-NONACHLOR	N MEAN STD	1 0.031	1 0.031

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.
LAKE ERIE, MIDDLE ISLAND

BLACK-CROWNED NIGHT-HERON			YEAR	
			82	86
TRANS-	N	10		
NONACHLOR	MEAN	0.068	1	
	STD	.0494		
PCB 1260	N	25.05	1	
	MEAN	7.9		
	STD	10.87		
PCB 1254:1260 (conversion to total PCB congener conc see pg. 39)	N	28.10	1	
	MEAN	13.2		
	STD	12.64		

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

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TABLE 11. Contaminant data, summarized by Location.*
LAKE ERIE, BIG CHICKEN ISLAND

DOUBLE-CRESTED CORMORANT		YEAR		
		72	79	81
PERCENT LIPID IN EGG	N MEAN STD	18 8.261 1.752	10 4.15 .2635	10 4.06 .6467
ALPHA-CHLORDANE	N MEAN STD	.10 .0425 .0408	.01 0.005	1
GAMMA-CHLORDANE	N MEAN STD			
OXY-CHLORDANE	N MEAN STD	.0656 .0296	.09 0.005	1
1234-CHLOROBENZENE	N MEAN STD			
PENTA-CHLOROBENZENE	N MEAN STD			
1235-/ 1245-CHLOROBENZENE	N MEAN STD			
HEXA-CHLOROBENZENE	N MEAN STD			
DDD	N MEAN STD			

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*
LAKE ERIE, BIG CHICKEN ISLAND

DOUBLE-CRESTED CORMORANT		YEAR		
		72	79	81
DDE	N	18	10	10
	MEAN	6.364	4.516	3.593
	STD	4.618	2.325	3.09
DDT	N	18	10	1
	MEAN	.0710	0.046	0.005
	STD	.0477	.0622	
DIELDRIN	N	18	10	1
	MEAN	.2328	0.261	0.25
	STD	.1399	.1622	
HEPTACHLOR	N	18	10	1
EPOXIDE	MEAN	.0222	0.091	0.05
	STD	.0081	0.089	
ALPHA-	N	18	10	1
HEXACHLORO-	MEAN	.0222	0.091	0.05
CYCLOHEXANE	STD	.0081	0.089	
BETA-	N	10	1	0.01
HEXACHLORO-	MEAN	.0.015		
CYCLOHEXANE	STD	.0133		
TOTAL MERCURY	N	18	10	1
	MEAN	448.9	0.049	0.05
	STD	.1314	.0913	.0311
MIREX	N	10	10	1
	MEAN	0.105	0.049	0.05
	STD			
PHOTOMIREX	N	10	10	1
	MEAN	.0315	.0263	
	STD			

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g. 1-96

TABLE 11. Contaminant data, summarized by Location.*
LAKE ERIE, BIG CHICKEN ISLAND

DOUBLE-CRESTED CORMORANT			YEAR		
	72	79	81	83	
TRANS-NONACHLOR	N MEAN STD				1 0.01
PCB 1260	N MEAN STD	18.81 12.25	10 35.52 18.81	10 33.8 9.674	1 29.3
PCB 1254:1260 (conversion to total PCB congener conc see pg. 39)	N MEAN STD				
			10 45.49 24.12	10 38.66 10.78	1 36.6

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*
LAKE ERIE, MIDDLE SISTER ISLAND

HERRING GULL		YEAR	
PERCENT LIPID IN EGG		78	
MEAN	44	9.186	
STD		.9790	
OXY-CHLORDANE	N	44 .1341 .0601	
HEXA-CHLOROBENZENE	N	44 .2523 .0.063	
DDE	N	44 5.279 1.472	
DDT	N	44 0.473 .0336	
DIELDRIN	N	44 .2170 .0.075	
HEPTACHLOR EPOXIDE	N	44 .0941 .0303	
BETA-HEXACHLOROCYCLOHEXANE	N	44 .0107 .0048	
MIREX	N	44 .1198 .1037	

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.
LAKE ERIE, MIDDLE SISTER ISLAND

HERRING GULL		YEAR	
		--	--
		78	
PHOTOMIREX	N	MEAN	44
		STD	.0458
			.0417
PCB 1260	N	MEAN	44
		STD	56.85
			14.54
PCB 1254:1260 (conversion to total PCB congener conc see pg. 39)	N	MEAN	44
		STD	67.19
			15.74

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

1-99

TABLE 11. Contaminant data, summarized by Location.
DETROIT RIVER, FIGHTING ISLAND

HERRING GULL		YEAR										
		72	78	79	81	82	83	84	85	86	87	88
PERCENT LIPID IN IN EGG	N MEAN STD	.13.5 .7071	8.327 .8912	9.04 .7608	8.13 .8807	8.6 1.403	8.109 .7842	9.05 .7561	8.56 1.376	6.7 .1.376	8.01 .9515	7.6 .9515
ALPHA- CHLORDANE	N MEAN STD	0.105 .0299	0.28 .1743	0.024 .0182	0.045 .0069	0.0145 .0048	0.017 .0072	0.0105 .0072	0.008 .0072	0.008 .0072	0.0174 .0036	0.0174 .0036
GAMMA- CHLORDANE	N MEAN STD	7 .1258 .1159	20 .0.009 .0.0025	11 .0.0025 0	10 .0.0275 .0.026	10 .0.052 .0.018	10 .0.026 .0.018	10 .0.052 .0.018	10 .0.026 .0.018	10 .0.052 .0.018	10 .0.017 .0	10 .0.017 .0
OXY- CHLORDANE	N MEAN STD	.1964 .1082	0.162 0.103	0.123 .0313	0.1695 .0926	0.1773 .0694	0.209 .0667	0.124 .0696	0.124 .0696	0.09 .0696	0.1081 .0456	0.1087 .0456
123- CHLOROBENZENE	N MEAN STD	10 .0087 .0048	10 .0087 .0048	10 .0087 .0048	10 .0087 .0048	10 .0087 .0048	10 .0087 .0048	10 .0087 .0048	10 .0087 .0048	10 .0087 .0048	10 .0.0175 .0	10 .0.0175 .0
124- CHLOROBENZENE	N MEAN STD	10 .0087 .0038	10 .0087 .0038	10 .0087 .0038	10 .0087 .0038	10 .0087 .0038	10 .0087 .0038	10 .0087 .0038	10 .0087 .0038	10 .0087 .0038	10 .0.0175 .0	10 .0.0175 .0
123- / 1245- CHLOROBENZENE	N MEAN STD	10 .0103 .0041	10 .0005 0	20 .0069 .0043	11 .0062 .0023	10 .0057 .0013	10 .0057 .0025	10 .0029 .0013	10 .0029 .0025	10 .0.0271 .0008	10 .0.0237 .0008	10 .0.0237 .0008
1234- CHLOROBENZENE	N MEAN STD	10 .0142 .0055	10 .0047 .0055	20 .0128 .0073	11 .0161 .0183	10 .0059 .0014	10 .0059 .0014	10 .0032 .0019	10 .0032 .0019	10 .0.0176 .0	10 .0.0175 .0	10 .0.0175 .0

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*
DETROIT RIVER, FIGHTING ISLAND

HERRING GULL				YEAR										
				72	78	79	81	82	83	84	85	86	87	88
PENTA-	N				10	10		11	10	10	10		10	1
CHLOROBENZENE	MEAN			.0741	0.027	0.0224		0.0162	0.0266	0.0111		.0098	.0103	
	STD			.0276	.0081	.0069	0.008	.0101	.0039			.0002		
HEXA-	N				2	11	45	10	20	11	10	1	10	1
CHLOROBENZENE	MEAN			0.31	.2809	.3716	0.248	.1317	.1251	.2097	0.092	.059	.0576	0.094
	STD			.0283	.0574	.0899	.0683	.0605	.0362	.0379	.0313		.0174	
DDD	N				2		45	10	20	11	10	1	10	1
	MEAN			0.08		.1351	0.086	.0765	.0218	0.024	0.017	0.012	0.017	0.015
	STD					0.082	0.042	.0559	0.006	.0151	.0067		.0129	
DDE	N				2	11	45	10	20	11	10	1	10	1
	MEAN			48.1	9.438	6.817	5.422	3.792	3.162	3.453	3.47	2.37	2.236	3.184
	STD			34.51	2.513	1.868	1.573	1.098	.8937	1.28	2.229		.8358	
DDT	N				2	11	45	10	20	11	10	1	10	1
	MEAN			.2682	.0936	.0458	0.064	.0335	.0089	.0065	0.018	0.014	.0165	.0221
	STD				.0378	.0171	.0267	0.025	.0026	.0024	.0092		.0074	
DIELDRIN	N				2	11	45	10	20	11	10	1	10	1
	MEAN			0.27	.1818	.1638	0.2	.0222	.2018	0.231	0.153	0.085	.0911	.0152
	STD				.1131	.0649	.0829	.1224	.1511	.0984	.054	.0867	.0317	
2378-	N						1	1	1	1	1	1	1	1
TETRACHLORO-							49	35	26	33	23	16	14	20
DIBENZO-P-														
DIOXIN														
12378-	N													
PENTACHLORO-														
DIBENZO-P-														
DIOXIN														
123678-	N													
HEXACHLORO-														
DIBENZO-P-														
DIOXIN														

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g. 1-101

TABLE 11. Contaminant data, summarized by Location.*
DETROIT RIVER, FIGHTING ISLAND

HERRING GULL		YEAR							
		72	78	79	81	82	83	84	85
1234678-	N MEAN				1 ND	1 ND	1 ND	1 ND	1 ND
HEPTACHLORO- DIBENZO-P- DIOXIN	STD								
OCTACHLORO- DIBENZO-P- DIOXIN	N MEAN				1 21	1 ND	1 ND	1 ND	1 ND
	STD								
2378-	N MEAN								
TETRACHLORO- DIBENZOFURAN	STD								
23478-	N MEAN								
PENTACHLORO- DIBENZOFURAN	STD								
123478- / 123467-	N MEAN								
HEXACHLORO- DIBENZOFURAN	STD								
123678-	N MEAN								
HEXACHLORO- DIBENZOFURAN	STD								
HEPTACHLOR EPOXIDE	N MEAN	0.08 .0141	0.955 .0398	0.077 .0225	0.09 .0261	0.093 .0303	0.096 .0266	0.061 .0241	0.0202 .0241
	STD								
ALPHA- HEXACHLORO- CYCLOHEXANE	N MEAN								
	STD								
BETA- HEXACHLORO- CYCLOHEXANE	N MEAN	0.145 .0117	0.098 .0014	0.016 .0084	0.0435 .0268	0.093 .0045	0.053 .0094	0.018 .0018	0.005 .0018
	STD								

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g. 1-102

TABLE 11. Contaminant data, summarized by Location.
DETROIT RIVER, FIGHTING ISLAND

HERRING GULL				YEAR											
	N	MEAN	STD	72	78	79	81	82	83	84	85	86	87	88	
GAMMA-HEXACHLOROCYCLOHEXANE	N MEAN STD	0.58 0.1131	0.093	0.21 0.1	.2375 0.065	20 0.1	11 0.055	10 0.165	10 0.0793	10 0.165	10 0.0793	10 0.0793	10 0.0793	10 0.0793	10 0.0793
TOTAL MERCURY	N MEAN STD	2 0.58 .1131	0.093	10 0.1	20 0.1	11 0.055	10 0.165	10 0.0793							
MIREX	N MEAN STD	11 .1273 .1076	0.115 .0606	10 .1043	20 .0826	11 .2173	10 .233	10 .373	10 .0.11						
PHOTOMIREX	N MEAN STD	11 0.02 .0268	10 0.039 .0173	10 0.02	20 0.0173	11 0.3862	10 .4339	10 .5495	10 0.005						
CIS-NONACHLOR	N MEAN STD	11 0.024 .0229	10 0.007	10 0.024	20 0.007	11 0.024	10 0.024								
TRANS-NONACHLOR	N MEAN STD	20 0.043 .0065	11 0.0123 .0032	10 0.011	20 0.0026	11 0.0032	10 0.0026								
OCTACHLOROSTYRENE	N MEAN STD	20 0.0234 .0065	11 0.0065 .0026	10 0.0026	20 0.0026	11 0.0026	10 0.0026								
PCB 1260	N MEAN STD	2 1.37 22.63	11 95.53 27.41	45 101.6 37.02	20 60.89 30.61	10 56.84 20.14	10 72.07 15.93	10 17.81 17.81							
PCB 1254:1260 (conversion to total PCB congener conc see pg. 39)	N MEAN STD	11 115.1 33.45	45 133.7 43.55	10 111 33.36	20 69.86 23.24	10 65.36 18	10 84.79 21.19	10 48.17 17.06	10 41.3 17.06	10 33.77 17.06	10 60.56 9.012	10 10 10	10 10 10	10 10 10	10 10 10

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g. 1-103

TABLE 11. Contaminant data, summarized by Location.
DETROIT RIVER, FIGHTING ISLAND

COMMON TERN		YEAR	
		'72	'79
PERCENT LIPID IN EGG	N	3	10
	MEAN	15.07	10.08
	STD	7.574	1.333
ALPHA-CHLORDANE	N	3	10
	MEAN	.0267	.0115
	STD		
OXY-CHLORDANE	N	10	10
	MEAN	0.019	0.019
	STD	.0057	
HEXA-CHLOROBENZENE	N	3	10
	MEAN	0.06	0.141
	STD	0.01	.0484
DDD	N	3	10
	MEAN	.0868	0.118
	STD	.0806	.0559
DDE	N	3	10
	MEAN	5.963	1.614
	STD	2.421	.4212
DDT	N	3	10
	MEAN	.1676	0.018
	STD	.2243	.0103
DIELDRIN	N	3	10
	MEAN	.2267	0.093
	STD	0.194	.0343
HEPTACHLOR EPOXIDE	N	3	10
	MEAN	.0533	0.02
	STD	.0586	.0067

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*
DETROIT RIVER, FIGHTING ISLAND

COMMON TERN		YEAR	
		72	79
BETA-HEXACHLORO-CYCLOHEXANE	N MEAN STD	10 .0043 .0049	
TOTAL MERCURY	N MEAN STD	3 .9733 1.053	
MIREX	N MEAN STD	10 .0143 .0181	
PHOTOMIREX	N MEAN STD	10 .0043 .0049	
PCB 1260	N MEAN STD	3 34.17 4.051	10 30.67 5.794
PCB 1254:1260 (conversion to total PCB congener conc see pg. 39)	N MEAN STD	10 38.56 7.748	

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g. 1-105

TABLE 11. Contaminant data, summarized by Location.*

DETROIT RIVER, FIGHTING ISLAND

RING-BILLED GULL		YEAR	
PERCENT LIPID IN EGG	N	79	84
MEAN	10	9.52	8.93
STD	1.136	.3057	
ALPHA-CHLORDANE	N	2	10
MEAN	0.04	0.02	
STD	.0424	.0067	
GAMMA-CHLORDANE	N	10	
MEAN	.0045		
STD	.0011		
OXY-CHLORDANE	N	6	10
MEAN	.0317	0.062	
STD	.0098	.0266	
1234-CHLOROBENZENE	N	10	
MEAN	.0007		
STD	.0006		
1235- / 1245-CHLOROBENZENE	N	10	
MEAN	.0007		
STD	.0006		
PENTA-CHLOROBENZENE	N	10	
MEAN	.0049		
STD	.0027		
HEXA-CHLOROBENZENE	N	10	10
MEAN	0.095	.0327	
STD	.0337	.0164	
DDD	N	10	10
MEAN	0.055	.0105	
STD	.0284	.0037	

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

Dioxins and furans measured in pg/g; all others measured in ug/g.

1-106

TABLE 11. Contaminant data, summarized by Location.*
DETROIT RIVER, FIGHTING ISLAND

RING-BILLED GULL		YEAR	
		79	84
DDE	N MEAN STD	10 2.093 .8744	10 1.081 .4933
DDT	N MEAN STD	10 .0281 .0174	10 .0203 .0233
DIELDRIN	N MEAN STD	10 0.355 .1697	10 0.276 .1423
HEPTACHLOR EPOXIDE	N MEAN STD	10 0.06 .0205	10 0.061 .0202
ALPHA- HEXACHLORO- CYCLOHEXANE	N MEAN STD	10 0.003 .0011	10 0.003 .0011
BETA- HEXACHLORO- CYCLOHEXANE	N MEAN STD	10 .0076 .0041	10 .0037 .0013
MIREX	N MEAN STD	10 0.054 .0106	10 0.0415 .0684
PHOTOMIREX	N MEAN STD	10 0.024 .0004	10 0.024 .0004
TRANS- NONACHLOR	N MEAN STD	10 0.016 0.007	10 0.016 0.007

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g. 1-107

TABLE 11. Contaminant data, summarized by Location.
DETROIT RIVER, FIGHTING ISLAND

RING-BILLED GULL		YEAR	
		79	84
PCB 1260	N	10	10
	MEAN	19.91	8.797
	STD	6.639	3.915
PCB 1254:1260 (conversion to total PCB congener conc see pg. 39)	N	10	10
	MEAN	23.24	10.63
	STD	8.067	4.661

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*
LAKE ST. CLAIR, WALPOLE ISLAND

	BLACK-CROWNED NIGHT-HERON	YEAR
PERCENT LIPID IN EGG	N MEAN STD	86 5.8
ALPHA-CHLORDANE	N MEAN STD	1 0.012
OXY-CHLORDANE	N MEAN STD	1 0.057
HEXA-CHLOROBENZENE	N MEAN STD	1 0.01
DDD	N MEAN STD	1 0.008
DDE	N MEAN STD	1.79
DDT	N MEAN STD	1 0.007
DIELDRIN	N MEAN STD	1 0.067
HEPTACHLOR EPOXIDE	N MEAN STD	1 0.023

*All units measured on wet weight basis.

Dioxins and furans measured in pg/g; all others measured in ug/g. 1-109

TABLE 11. Contaminant data, summarized by Location.*
LAKE ST. CLAIR, WALPOLE ISLAND

BLACK-CROWNED NIGHT-HERON		YEAR
BETA-HEXAChLORO-	N MEAN STD	86 .0005 1
CYCLOHEXANE	N MEAN STD	0.114 1
MIREX	N MEAN STD	0.043 1
PHOTOMIREX	N MEAN STD	0.074 1
CIS-NONACHLOR	N MEAN STD	0.18 1
TRANS-NONACHLOR	N MEAN STD	4.37 1
PCB 1260	N MEAN STD	8.7 1
PCB 1254:1260 (conversion to total PCB congener conc see pg. 39)	N MEAN STD	

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g. 1-110

TABLE 11. Contaminant data, summarized by Location.
LAKE ST. CLAIR, WALPOLE ISLAND

FORSTERS TERN	YEAR	
PERCENT LIPID IN EGG	N MEAN STD	1 7.9
ALPHA-CHLORDANE	N MEAN STD	1 0.028
OXY-CHLORDANE	N MEAN STD	1 0.044
HEXA-CHLOROBENZENE	N MEAN STD	1 0.044
DDD	N MEAN STD	1 0.008
DDE	N MEAN STD	1 1.47
DDT	N MEAN STD	1 0.052
DIELDRIN	N MEAN STD	1 0.133
HEPTACHLOR EPOXIDE	N MEAN STD	1 0.044

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

1-111

TABLE 11. Contaminant data, summarized by Location.*
LAKE ST. CLAIR, WALPOLE ISLAND

FORSTERS TERN	YEAR
	86
BETA-HEXACHLOROCYCLOHEXANE	N MEAN .1 .0005
	STD
MIREX	N MEAN .1 .037
	STD
PHOTOMIREX	N MEAN .1 .009
	STD
CIS-NONACHLOR	N MEAN .1 .071
	STD
TRANS-NONACHLOR	N MEAN .1 .243
	STD
PCB 1260	N MEAN .1 5.53
	STD
PCB 1254:1260 (conversion to total PCB congener conc see pg. 39)	N MEAN .1 12.8
	STD

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g. 1-112

TABLE 11. Contaminant data, summarized by Location.
ST. CLAIR RIVER

HERRING GULL		YEAR
PERCENT LIPID IN EGG	MEAN STD	9.1 87
ALPHA-CHLORDANE	N MEAN STD	.0132 1
GAMMA-CHLORDANE	N MEAN STD	.0016 1
OXY-CHLORDANE	N MEAN STD	.1385 1
1234-CHLOROBENZENE	N MEAN STD	.0176 1
1235-/ 1245-CHLOROBENZENE	N MEAN STD	.0266 1
PENTA-CHLOROBENZENE	N MEAN STD	.0363 1
HEXA-CHLOROBENZENE	N MEAN STD	.1078 1
DDD	N MEAN STD	.0143 1

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g. 1-113

TABLE 11. Contaminant data, summarized by Location.*

ST. CLAIR RIVER

HERRING GULL		YEAR
DDE	N MEAN STD	1 2.409 .0444
DDT	N MEAN STD	1 .1737 .0904
DIELDRIN	N MEAN STD	1 .0025 .0031
HEPTACHLOR EPOXIDE	N MEAN STD	1 .0021 .0249
ALPHA- HEXACHLORO- CYCLOHEXANE	N MEAN STD	1 .0177
BETA- HEXACHLORO- CYCLOHEXANE	N MEAN STD	
GAMMA- HEXACHLORO- CYCLOHEXANE	N MEAN STD	
MIREX	N MEAN STD	
PHOTOMIREX	N MEAN STD	

*All units measured on wet weight basis.

Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*

ST. CLAIR RIVER

HERRING GULL	YEAR
CIS-NONACHLOR	87
N MEAN	1
STD	.0408
TRANS-	
N MEAN	1
NONACHLOR	.0649
STD	
OCTACHLORO-	
N MEAN	1
STYRENE	.0931
STD	
PCB 1260	12.68
N MEAN	1
STD	
PCB 1254:1260	26.24
(conversion	1
to total PCB	
congener conc	
see pg. 39)	

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g. 1-115

TABLE 11. Contaminant data, summarized by Location.*

LAKE HURON, CHANTRY ISLAND

HERRING GULL		YEAR													
		74	75	77	78	79	80	81	82	83	84	85	86	87	88
PERCENT LIPID	N	10	10	10	15	10	10	10	10	11	10	10	10	10	10
IN EGG	MEAN	8.15	8.61	9.44	10.2	7.72	9.42	9.23	8.22	8.027	8.82	9.04	8	1	1
	STD	1.052	.8157	.8113	1.664	.8108	.7146	1.451	.9589	.7656	.5633	.7516	9	8.662	.3641
ARSENIC	N														
	MEAN														
	STD														
CADMIUM	N														
	MEAN														
	STD														
ALPHA-CHLORDANE	N	10	5	10	10	10	3	11	10	10	10	10	1	1	1
	MEAN	0.061	0.14	0.087	0.084	0.187	0.167	0.005	0.01	0.012	0.012	0.016	0.016	0.0174	.0093
	STD	.0354	0.098	.0291	.0255	.0678	.0115	.0034	.0041	.0059					
GAMMA-CHLORDANE	N														
	MEAN														
	STD														
OXY-CHLORDANE	N														
	MEAN														
	STD														
123-CHLOROBENZENE	N														
	MEAN														
	STD														
124-CHLOROBENZENE	N														
	MEAN														
	STD														
135-CHLOROBENZENE	N														
	MEAN														
	STD														

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g. 1-116

TABLE 11. Contaminant data, summarized by Location.
LAKE HURON, CHANTRY ISLAND

		YEAR													
		74	75	77	78	79	80	81	82	83	84	85	86	87	88
1234-	N														
CHLOROBENZENE	MEAN														
	STD														
1235- / 1245-	N														
CHLOROBENZENE	MEAN														
	STD														
PENTA-	N														
CHLOROBENZENE	MEAN														
	STD														
HEXA-	N														
CHLOROBENZENE	MEAN														
	STD														
DDD	N	10	10	15	10	10	10	10	10	10	10	10	10	10	10
	MEAN	0.294	0.0336	0.2270	0.13	0.108	0.108	0.035	0.162	0.127	0.085	0.235	0.01	0.037	0.087
	STD	0.0726	0.0352	0.0825	0.1027	0.0394	0.027	0.0143	0.0832	0.0087	0.0024	0.0309			0.016
DDE	N	10	10	15	10	10	10	10	10	10	10	10	10	10	10
	MEAN	20.97	11.85	13.32	6.143	2.543	2.831	4.081	5.029	2.224	2.547	2.466	2	1.044	1.116
	STD	8.637	4.402	4.57	2.41	1.69	1.442	1.858	3.228	1.006	1.676	1.293			.6921
DDT	N	10	10	15	10	10	10	10	10	10	10	10	10	10	10
	MEAN	.6345	1.1520	0.910	0.827	0.057	0.04	0.028	0.077	0.02	0.011	0.067	0.064	0.0125	0.13
	STD	.2266	.1188	.0495	.0745	.0189	.0141	.0123	.0.04	.0.011	.0.052	.0.0306			.0.0233
DIELDRIN	N	10	10	15	10	10	10	10	10	10	10	10	10	10	10
	MEAN	0.471	0.31	0.574	2.387	0.278	0.232	0.251	0.291	0.1973	0.186	0.286	0.238	0.1001	0.2086
	STD	0.176	1.955	.2491	.1339	.0899	.0718	.0926	.2092	.0.06	.0.789	.0.0817			.0.0465
2378-	N														
TETRACHLORO-	MEAN														
DIBENZO-P-	STD														
DIOXIN															

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g. 1-117

TABLE 11. Contaminant data, summarized by Location.*
LAKE HURON, CHANTRY ISLAND

HERRING GULL		YEAR													
		74	75	77	78	79	80	81	82	83	84	85	86	87	88
12378-	N MEAN STD														
PENTACHLORO-DIBENZO-P-DIOXIN															
123678-	N MEAN STD														
HEXAChLORO-DIBENZO-P-DIOXIN															
1234678-	N HEPTACHLORO-P- DIBENZO-P-DIOXIN														
OCTACHLORO-DIBENZO-P-DIOXIN															
2378-	N MEAN STD														
TETRACHLORO-DIBENZOFURAN															
23478-	N PENTACHLORO-DIBENZOFURAN														
123478- / 123467- HEXAChLORO-DIBENZOFURAN	N MEAN STD														
123678- HEXAChLORO-DIBENZOFURAN	N MEAN STD														
HEPTACHLOR-EPOXIDE	N MEAN STD														

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

1-118

TABLE 11. Contaminant data, summarized by Location.
LAKE HURON, CHANTRY ISLAND

		YEAR													
		HERRING GULL					YEAR								
		74	75	77	78	79	80	81	82	83	84	85	86	87	88
ALPHA-HEXACHLORO-CYCLOHEXANE	N MEAN STD														
BETA-HEXACHLORO-CYCLOHEXANE	N MEAN STD														
GAMMA-HEXACHLORO-CYCLOHEXANE	N MEAN STD														
LEAD	N MEAN STD														
TOTAL MERCURY	N MEAN STD	10 0.244 0.067	10 0.228 .0769	10 0.228 .0769	10 0.228 .0769	10 0.228 .0769	10 0.228 .0769	10 0.228 .0769	10 0.228 .0769	10 0.228 .0769	10 0.228 .0769	10 0.228 .0769	10 0.228 .0769	10 0.228 .0769	10 0.228 .0769
MIREX	N MEAN STD	10 2.155 2.056	10 0.478 .5647	10 0.332 0.216	15 .2427 .2844	10 0.201 0.326	10 0.159 0.1617	10 0.352 .3667	10 0.156 .6309	10 0.492 .0789	10 0.141 .3776	10 0.141 .1347	10 0.128 .1347	10 0.114 .1347	10 0.129 .0722
PHOTOMIREX	N MEAN STD														
CIS-NONACHLOR	N MEAN STD														
TRANS-NONACHLOR	N MEAN STD														

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g. 1-119

TABLE 11. Contaminant data, summarized by Location.

LAKE HURON, CHANTRY ISLAND

		YEAR													
		74	75	77	78	79	80	81	82	83	84	85	86	87	88
HERRING GULL		N													
OCTACHLORO-															
STYRENE															
PCB 1260	N	10	10	10	15	10	10	10	10	10	11	10	10	11	13
	MEAN	64.54	30.29	53.12	32.32	27.37	20.71	24.89	33.22	14.05	18.1		5.06	3.692	3.999
	STD	16.26	13.11	14.08	13.05	18.44	12.59	8.876	30.02	2.849	8.299				6.578
PCB 1254:1260 (conversion to total PCB congener conc see pg. 39)	N	10	10	10	15	10	10	10	10	10	11	10	10	10	13
	MEAN	85.67	39.33	63.66	36.62	31.08	23.41	27.7	38.06	16.86	21.54	14.25	12.3	7.71	8.007
	STD	21.68	17.1	16.51	14.35	22.94	14.54	9.852	33.71	3.449	9.939	9.55			10.81
SELENIUM	N				1										
	MEAN				0.2										
	STD														

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g. 1-120

TABLE 11. Contaminant data, summarized by Location.*
LAKE HURON, CHANTRY ISLAND

BLACK-CROWNED NIGHT-HERON		YEAR
PERCENT LIPID IN EGG	N MEAN STD	1 6.3 82
GAMMA-CHLORDANE	N MEAN STD	1 0.005 0.15
OXY-CHLORDANE	N MEAN STD	1 0.15 0.15
1,2,3,4-CHLOROBENZENE	N MEAN STD	1 .0003 .0003
1,2,3,5-/1,2,4,5-CHLOROBENZENE	N MEAN STD	1 .0003 .0003
PENTA-CHLOROBENZENE	N MEAN STD	1 .0003 .0003
HEXA-CHLOROBENZENE	N MEAN STD	1 0.035 0.035
DDD	N MEAN STD	1 0.02 0.02
DDE	N MEAN STD	1 3.96 3.96

*All units measured on wet weight basis: Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*

LAKE HURON, CHANTRY ISLAND

BLACK-CROWNED NIGHT-HERON		YEAR
DDT	N MEAN STD	1 0.03
DIELDRIN	N MEAN STD	1 0.11
HEPTACHLOR EPOXIDE	N MEAN STD	1 0.06
ALPHA- HEXACHLORO- CYCLOHEXANE	N MEAN STD	1 .0025
BETA- HEXACHLORO- CYCLOHEXANE	N MEAN STD	1 .0025
MIREX	N MEAN STD	1 0.19
TRANS- NONACHLOR	N MEAN STD	1 0.04
PCB 1260	N MEAN STD	1 17.6
PCB 1254:1260 (conversion to total PCB congener conc see pg. 39)	N MEAN STD	1 19.2

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*
LAKE HURON, KETTLE POINT

COMMON TERN	YEAR
	72
PERCENT LIPID IN EGG	2 MEAN 12.95 STD 2.051
HEXA-CHLOROBENZENE	2 N 0.17 MEAN STD
DDD	2 N 0.045 MEAN STD .0495
DDE	2 N 5.635 MEAN STD .8697
DDT	2 N 0.0279 MEAN STD .0237
DIELDRIN	2 N 0.0141 MEAN STD .0141
HEPTACHLOR EPOXIDE	2 N 0.035 MEAN STD .0212
TOTAL MERCURY	2 N 0.1414 MEAN STD .1414
PCB 1260	2 N 28.35 MEAN STD 4.172

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

1-123

TABLE 11. Contaminant data, summarized by Location.*

LAKE HURON, MANITOBA REEF

HERRING GULL	YEAR
	80
PERCENT LIPID IN EGG	10 MEAN STD
	8.3 .4761
1234-CHLOROBENZENE	10 N MEAN STD
	.0756 .2348
1235- / 1245-CHLOROBENZENE	10 N MEAN STD
	0.003 .0058
PENTA-CHLOROBENZENE	10 N MEAN STD
	.949 .2889
HEXA-CHLOROBENZENE	10 N MEAN STD
	.973 .0748
DDE	10 N MEAN STD
	6.38 3.881
MIREX	10 N MEAN STD
	.206 .2651
PCB 1260	10 N MEAN STD
	39.57 37.95
PCB 1254; 1260 (conversion to total PCB congener conc see pg. 39)	10 N MEAN STD
	43.12 41.69

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*
LAKE HURON, BLACK RIVER

HERRING GULL	YEAR
PERCENT LIPID IN EGG	10 7.92 .7036
1234-CHLOROBENZENE	N MEAN STD 0.169 .0325
1235-/ 1245-CHLOROBENZENE	N MEAN STD 10 0.066 0.013
PENTA-CHLOROBENZENE	N MEAN STD 0.0134 .0157
HEXA-CHLOROBENZENE	N MEAN STD 10 0.1127 .0422
DDE	N MEAN STD 10 5.831 2.718
MIREX	N MEAN STD 10 0.121 .1319
PCB 1260	N MEAN STD 10 26.91 10.55
PCB 1254:1260 (conversion to total PCB congener conc see pg. 39)	N MEAN STD 10 28.68 11.07

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g. 1-125

TABLE 11. Contaminant data, summarized by Location.*
LAKE HURON, LITTLE CHARITY ISLAND

		YEAR
HERRING GULL		80
PERCENT LIPID IN EGG	MEAN	10 .783
	STD	.7134
1234-CHLOROBENZENE	N	10 .1242
	MEAN	.1827
1235-/ 1245-CHLOROBENZENE	N	10 .0485
	MEAN	.0419
PENTA-CHLOROBENZENE	N	10 .0327
	MEAN	0.026
HEXA-CHLOROBENZENE	N	10 .0449
	MEAN	
DDE	N	10 6.442
	MEAN	
MIREX	N	10 0.082
	MEAN	
PCB 1260	N	10 40.88
	MEAN	
PCB 1254:1260 (conversion to total PCB congener conc see pg. 39)	N	10 41.93
	MEAN	
	STD	12.94

*All units measured on wet weight basis.

Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.
LAKE HURON, CHANNEL SHELTER ISLAND

HERRING GULL		YEAR								
		80	81	82	83	84	85	86	87	88
PERCENT LIPID	N	10	10	11	10	10	10	10	1	1
IN EGG	MEAN	8.85	7.24	9.04	8.655	9.35	8.83	7.9	9.5	1.16
	STD	.8086	.8099	1.221	.6006	.4403	.5272			1.148
ALPHA-	N	10	10	11	10	10	10	1	1	1
CHLORDANE	MEAN	0.161	0.024	0.019	0.013	0.017	0.02	0.02	0.0118	0.0127
	STD	.0674	.0117	.003	.0048	.0095				.0056
GAMMA-	N	2	8	11	10	10	10	1	1	1
CHLORDANE	MEAN	0.452	0.0363	0.0032	0.0075	0.005				1.16
	STD	.0633	.0185	.0012	.0026					.0012
OXY-	N	10	10	11	10	10	10	1	1	1
CHLORDANE	MEAN	0.121	0.244	0.1445	0.162	0.137	0.152	.1321	.1418	
	STD	.0407	.1871	.0383	.0692	.0544				.0627
1,234-	N	10	10	11	10	10	10	1	1	1
CHLOROBENZENE	MEAN	5717	1.749	0.0005	0.788	3.859	7.291			
	STD	.3366	.5595	0	.3802	0.096	.3036			
1,235-/1,245-	N	10	10	11	10	10	10	1	1	1
CHLOROBENZENE	MEAN	1762	.4532	.0005	.1392	.0757	.0775			
	STD	.0831	.1222	0	.0755	.0216	.0371			
PENTA-	N	10	10	11	10	10	10	1	1	1
CHLOROBENZENE	MEAN	0.876	1.775	1.197	1.568	.0726	.0685			
	STD	.0422	.0.052	.0485	.0755	.0219	.0.029			
HEXA-	N	10	10	11	10	10	10	1	1	1
CHLOROBENZENE	MEAN	1935	.1367	.1719	.1375	.0873	.0871	.0.074	.0.072	.0.08
	STD	.0554	.0215	0.05	.0633	.0258	.0228			.0243
DDD	N	9	9	11	10	10	1	1	1	1
	MEAN	.2211	.0833	.0318	0.023	0.068	0.031	.0378	.0351	
	STD	.0501	.0367	.0218	.0106	.0225			.0238	

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*

LAKE HURON, CHANNEL SHELTER ISLAND

HERRING GULL				YEAR								
	N	MEAN	STD	80	81	82	83	84	85	86	87	88
DDE	N	10	10	10	10	11	10	10	10	10	1	1
	MEAN	8.899	7.297	8.099	6.059	5.41	4.808	5.95	4.002	4.548		
	STD	3.77	2.052	2.915	1.942	2.062	1.367				1.725	
DDT	N	10	10	11	10	10	10	10	10	1	1	1
	MEAN	0.049	0.039	0.01	0.0095	0.041	0.038	0.0197	0.0402			
	STD	.0213	.0173	.0039	.0044	.0191				.0272		
DIELDRIN	N	10	10	11	10	10	10	10	10	1	1	1
	MEAN	0.175	0.315	0.1573	0.229	0.207	0.177	0.1922	0.1856			
	STD	.0814	.1697	.0559	.0964	.075				.0076		
2378-TETRACHLORODIBENZO-P-DIOXIN	N	1	1	1	1	1	1	1	1	1	1	1
	MEAN	155	214	141	99	87	87	88	137	86		
12378-PENTACHLORODIBENZO-P-DIOXIN	N	1	1	1	1	1	1	1	1	1	1	1
	MEAN	39	55	35	27	27	29	25	25	27	23	
123678-HEPTACHLORODIBENZO-P-DIOXIN	N	1	1	1	1	1	1	1	1	1	1	1
	MEAN	42	71	61	35	35	35	37	37	30	30	
1234678-HEPTACHLORODIBENZO-P-DIOXIN	N	1	1	1	1	1	1	1	1	1	1	1
	MEAN	8	8	11	7	7	9	7	7	6	9	
OCTACHLORODIBENZO-P-DIOXIN	N	1	1	1	1	1	1	1	1	1	1	1
	MEAN	77	15	29	31	31	10	10	10	17	21	
2378-TETRACHLORODIBENZOFURAN	N	1	1	1	1	1	1	1	1	2	1	1
	MEAN									2	3	
	STD											

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*
LAKE HURON, CHANNEL SHELTER ISLAND

HERRING GULL		YEAR								
		80	81	82	83	84	85	86	87	88
23478-	N									
PENTACHLORO-	MEAN									
DIBENZOFURAN	STD									
123478- /	N									
123467-	MEAN									
HEXACHLORO-	STD									
DIBENZOFURAN										
123678-	N									
HEXACHLORO-	MEAN									
DIBENZOFURAN	STD									
HEPTACHLOR	N									
EPOXIDE	MEAN									
	STD									
ALPHA-	N									
HEXACHLORO-	MEAN									
CYCLOHEXANE	STD									
BETA-	N									
HEXACHLORO-	MEAN									
CYCLOHEXANE	STD									
GAMMA-	N									
HEXACHLORO-	MEAN									
CYCLOHEXANE	STD									
TOTAL MERCURY	N									
	MEAN									
	STD									
MIREX	N									
	MEAN									
	STD									

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*

LAKE HURON, CHANNEL SHELTER ISLAND

			YEAR								
			80	81	82	83	84	85	86	87	88
	N										
HERRING GULL											
PHOTOMIREX	MEAN										
	STD										
CIS-NONACHLOR	N										
	MEAN										
	STD										
TRANS-	N										
NONACHLOR	MEAN										
	STD										
OCTACHLORO-	N										
STYRENE	MEAN										
	STD										
PCB 1260	N										
	MEAN										
	STD										
PCB 1254:1260	N										
(conversion	MEAN										
to total PCB	STD										
congener conc											
see pg. 39)											

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g. 1-130

TABLE 11. Contaminant data, summarized by Location.*
LAKE HURON, NOTTAWASAGA ISLAND

HERRING GULL	YEAR
PERCENT LIPID IN EGG	80
MEAN	10 7.93
STD	.8845
1234-CHLOROBENZENE	N MEAN STD
	10 .0043 .0027
1235-/ 1245-CHLOROBENZENE	N MEAN STD
	10 .0045 .0017
PENTA-CHLOROBENZENE	N MEAN STD
	10 .0107 .0073
HEXA-CHLOROBENZENE	N MEAN STD
	10 .0784 .0379
DDE	N MEAN STD
	10 2.133 1.136
MIREX	N MEAN STD
	10 0.307 .2966
PCB 1260	N MEAN STD
	10 14.47 6.793
PCB 1254:1260 (conversion to total PCB congener conc see pg. 39)	N MEAN STD
	10 16.19 7.432

*All units measured on wet weight basis.

Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*
LAKE HURON, WALLIS ROCK

DOUBLE-CRESTED CORMORANT		YEAR		
		71	72	73
PERCENT LIPID IN EGG	N MEAN STD	2 3.9 .5657	3 7.7 1.852	1 3.2
HEXA-CHLOROBENZENE	N MEAN STD	0.495 .6576	0.083 .0029	0.02
DDD	N MEAN STD	2 0.235 .1344	3 13.67 .1102	1 0.2
DDE	N MEAN STD	2 15.85 .051	3 15.6 1.908	1 12.4
DDT	N MEAN STD	2 1.576 .0860	3 .4321 .4477	1 .6258
DIELDRIN	N MEAN STD	2 0.465 .1202	3 .1233 .1358	1 0.53
HEPTACHLOR EPOXIDE	N MEAN STD	2 0.095 .0636	3 0.04 0.01	1 0.06
TOTAL MERCURY	N MEAN STD	2 0.82 .1131	3 .5267 .0404	1 0.71
PCB 1260	N MEAN STD	2 11.75 11.67	3 24.93 2.714	1 17.4

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*
LAKE HURON, SOUTH LIMESTONE ISLAND

HERRING GULL	YEAR
PERCENT LIPID IN EGG	76
PERCENT LIPID IN EGG	2
MEAN	9.3
STD	1.414
ALPHA-CHLORDANE	N
	MEAN
	STD
OXY-CHLORDANE	N
	MEAN
	STD
HEXA-CHLOROBENZENE	N
	MEAN
	STD
DDD	N
	MEAN
	STD
DDE	N
	MEAN
	STD
DDT	N
	MEAN
	STD
DTEDDRIN	N
	MEAN
	STD
HEPTACHLOR EPOXIDE	N
	MEAN
	STD

*All units measured on wet weight basis.

Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*
LAKE HURON, SOUTH LIMESTONE ISLAND

HERRING GULL		YEAR
BETA-HEXACHLOROCYCLOHEXANE	N MEAN STD	2 0.03 0
TOTAL MERCURY	N MEAN STD	2 0.38 .0424
MIREX	N MEAN STD	2 1.51 .2546
PHOTOMIREX	N MEAN STD	2 0.545 .0636
PCB 1260	N MEAN STD	2 62.95 5.303
PCB 1254;1260 (conversion to total PCB congener conc see pg. 39)	N MEAN STD	2 74.9 6.364

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g. 1-134

TABLE 11. Contaminant data, summarized by Location.*
LAKE HURON, SOUTH LIMESTONE ISLAND

CASPION TERN		YEAR	
		72	80
PERCENT LIPID	N	1	10
IN EGG	MEAN	9.8	7.11
	STD	.5666	
1234-	N	10	
CHLOROBENZENE	MEAN	.0029	
	STD	.0074	
1235- / 1245-	N	10	
CHLOROBENZENE	MEAN	.0014	
	STD	.0027	
PENTA-	N	10	
CHLOROBENZENE	MEAN	.0022	
	STD	.0024	
HEXA-	N	1	
CHLOROBENZENE	MEAN	0.03	10
	STD	.0318	
		.0127	
DDD	N	1	
	MEAN	0.65	
	STD		
DDE	N	1	
	MEAN	15.8	10
	STD	1.297	
DDT	N	1	
	MEAN	.7152	
	STD		
DIELDRIN	N	1	
	MEAN	0.08	
	STD		

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g. 1-135

TABLE 11. Contaminant data, summarized by Location.
LAKE HURON, SOUTH LIMESTONE ISLAND

CASPION TERN		YEAR	
HEPTACHLOR EPOXIDE	N MEAN STD	72 0.03 0.01	80
TOTAL MERCURY	N MEAN STD	1 0.94 0.1	1
MIREX	N MEAN STD	10 0.306 .1511	
PCB 1260	N MEAN STD	1 31.8 8.093	10 22.67 8.093
PCB 1254:1260 N (conversion to total PCB congener conc see pg. 39)	N MEAN STD	10 26.04 9.668	

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*
LAKE HURON, BLACKBILL ISLANDS

DOUBLE-CRESTED CORMORANT			YEAR
PERCENT LIPID IN EGG	N	70	71
MEAN	MEAN	4.543	8
STD	STD	3.561	5.5
HEXA-CHLOROBENZENE	N	6	
	MEAN	2067	
	STD	0.283	
DDD	N	7	8
	MEAN	4.508	1694
	STD	4.368	.2136
DDE	N	7	8
	MEAN	24.89	15.64
	STD	29.49	8.936
DDT	N	7	8
	MEAN	10.52	4184
	STD	9.826	.4116
DIELDRIN	N	7	8
	MEAN	7036	4646
	STD	0.645	0.278
HEPTACHLOR EPOXIDE	N	7	8
	MEAN	7327	0553
	STD	.7209	.0388
TOTAL MERCURY	N	7	
	MEAN	5443	
	STD	.2316	
PCB 1260	N	7	8
	MEAN	20.54	22.78
	STD	16.47	10.47

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*

LAKE HURON, CASTLE ROCK

HERRING GULL	YEAR
	80
PERCENT LIPID IN EGG	10 MEAN STD
1234-CHLOROBENZENE	10 N MEAN STD
1235-/ 1245-CHLOROBENZENE	10 N MEAN STD
PENTA-CHLOROBENZENE	10 N MEAN STD
HEXA-CHLOROBENZENE	10 N MEAN STD
DDE	10 N MEAN STD
MIREX	10 N MEAN STD
PCB 1260	10 N MEAN STD
PCB 1254:1260 (conversion to total PCB)	10 N MEAN STD
congener conc see pg. 39)	17.59 6.448

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*
LAKE HURON, BUSTARD ROCK

DOUBLE-CRESTED CORMORANT		YEAR
		72
PERCENT LIPID IN EGG	N MEAN STD	.3 8.667 2.663
HEXA-CHLOROBENZENE	N MEAN STD	.3 0.01 0
DDD	N MEAN STD	.3 0.11 .1058
DDE	N MEAN STD	.3 16.37 8.41
DDT	N MEAN STD	.3 .3427 .2411
DIELDRIN	N MEAN STD	.3 0.29 .1609
HEPTACHLOR EPOXIDE	N MEAN STD	.3 0.04 0.02
TOTAL MERCURY	N MEAN STD	.3 82.67 .0862
PCB 1260	N MEAN STD	.3 22.97 12.63

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.

LAKE HURON, HALF MOON ISLAND

CASPIAN TERN	YEAR
PERCENT LIPID IN EGG	8.844
MEAN	8.263
STD	
1234- CHLOROBENZENE	N 9 MEAN .0023 STD .0033
1235- / 1245- CHLOROBENZENE	N 9 MEAN .0001 STD .0015
PENTA- CHLOROBENZENE	N 9 MEAN .0023 STD .0024
HEXA- CHLOROBENZENE	N 9 MEAN .0409 STD .0157
DDE	N 9 MEAN 3.246 STD 1.115
MIREX	N 9 MEAN 0.09 STD .0634
PCB 1260	N 9 MEAN 17.37 STD 6.282
PCB 1254:1260 (conversion to total PCB congener conc see pg. 39)	N 9 MEAN 18.49 STD 6.878

*All units measured on wet weight basis.

Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*
LAKE HURON, GULL ROCK

DOUBLE-CRESTED CORMORANT		YEAR	
		72	75
PERCENT LIPID IN EGG		9 7.5 1.401	1 4.1
HEXA-CHLOROBENZENE	N MEAN STD	.0111 .0055	1 0.01
DDD	N MEAN STD	.1222 .0636	1 0.005
DDE	N MEAN STD	.1449 .05292	1 3.76
DDT	N MEAN STD	.2522 .2332	1 .0447
DIELDRIN	N MEAN STD	.4133 .3633	1 .0.23
HEPTACHLOR EPOXIDE	N MEAN STD	.0589 .0494	1 0.03
TOTAL MERCURY	N MEAN STD	.3556 .0.121	1 0.36
PCB 1260	N MEAN STD	.248 .8.891	1 17.3

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.
LAKE HURON, GULL ROCK

DOUBLE-CRESTED CORMORANT	YEAR	
	72	75
PCB 1254; 1260 (N (conversion to total PCB congener conc see pg. 39)	1 MEAN STD	22.3

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g. 1-142

TABLE 11. Contaminant data, summarized by Location.*
LAKE HURON, THE COUSINS ISLAND

		YEAR
CASPIAN TERN		
PERCENT LIPID	N IN EGG	10 0.731
	MEAN	7.01
	STD	0.731
1234- CHLOROBENZENE	N STD	10 .0033
1235-/ 1245- CHLOROBENZENE	N STD	10 .0005
PENTA- CHLOROBENZENE	N STD	10 .0038
HEXA- CHLOROBENZENE	N STD	10 .0053
DDE	N MEAN STD	4.692 1.899
MIREX	N MEAN STD	10 0.069 .0213
PCB 1260	N MEAN STD	10 28.63 8.454
PCB 1254:1260 (conversion to total PCB congener conc see pg. 39)	N MEAN STD	10 30.89 9.277

*All units measured on wet weight basis.

Dioxins and furans measured in ug/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*

LAKE HURON, DOUCET ROCK

DOUBLE-CRESTED CORMORANT		YEAR		
		71	72	75
PERCENT LIPID	N	7	2	1
IN EGG	MEAN	5.371	7.35	0.7
	STD	.7365	.3536	
HEXA-	N	7	2	1
CHLOROBENZENE	MEAN	.0371	.0075	0.01
	STD	.0138	.0035	
DDD	N	7	2	1
	MEAN	.1261	0.12	0.13
	STD	.2553	0.099	
DDE	N	7	2	1
	MEAN	17.77	15.21	3.32
	STD	12.27	13.71	
DDT	N	7	2	1
	MEAN	.2971	.3017	.0894
	STD	.2845	.2371	
DIELDRIN	N	7	2	1
	MEAN	.5571	0.5	0.16
	STD	0.356	.5798	
HEPTACHLOR	N	7	2	1
EPOXIDE	MEAN	.0586	.0325	0.01
	STD	.0344	.0389	
TOTAL MERCURY	N	7	2	1
	MEAN	.6286	0.385	0.51
	STD	.2637	.0495	
PCB 1260	N	7	2	1
	MEAN	31.91	25.6	10.1
	STD	13.09	19.8	

*All units measured on wet weight basis.

Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.
LAKE HURON, DOUCET ROCK

DOUBLE-CRESTED CORMORANT	YEAR		
	71	72	75
PCB 1254:1260 N			
(conversion	MEAN		1
to total PCB	STD		
congener conc		11.9	
see pg. 39)			

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g. 1-145

TABLE 11. Contaminant data, summarized by Location.
LAKE HURON, DOUBLE ISLAND

		YEAR													
HERRING GULL		74	75	77	78	79	80	81	82	83	84	85	86	87	88
PERCENT LIPID	N	10	10	10	10	10	10	10	10	10	10	10	10	10	10
IN EGG	MEAN	9.31	7.25	9.42	8.98	8.72	9.06	9.58	8.3	8.455	9.85	9.51	8.1	8.6	1.13
	STD	0.948	1.136	2.853	.6408	1.004	1.485	.8715	.9854	1.214	.9618	.5801	8.3	8.6	8.392
ARSENIC	N	1													.5766
	MEAN														
	STD														
CADMIUM	N	1													
	MEAN														
	STD														
ALPHA-CHLORDANE	N	10	10	10	10	10	10	10	10	10	10	10	10	10	10
	MEAN	0.042	0.095	0.063	0.174	0.012	0.019	0.019	0.01	0.016	0.01	0.016	0.01	0.016	0.01
	STD	.0181	.0317	.0283	.0712	.0042	.0049	.0049	0	0.0107	0	0.0107	0	0.0107	0
GAMMA-CHLORDANE	N	5	10	10	10	10	10	10	10	10	10	10	10	10	10
	MEAN	0.074	0.095	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025
	STD	.0365	.0016	.0016	.0016	.0016	.0016	.0016	.0016	.0016	.0016	.0016	.0016	.0016	.0016
OXY-CHLORDANE	N	10	10	10	10	10	10	10	10	10	10	10	10	10	10
	MEAN	3580	0.166	0.113	0.084	0.129	0.244	0.2218	0.136	0.222	0.1051	0.1051	0.1051	0.1051	0.1051
	STD	.3309	.0911	.0807	.0608	.0412	.1137	.1735	.0443	.1163					
123-CHLOROBENZENE	N	10	10	10	10	10	10	10	10	10	10	10	10	10	10
	MEAN														
	STD														
124-CHLOROBENZENE	N	10													
	MEAN														
	STD														
135-CHLOROBENZENE	N	10													
	MEAN														
	STD														

All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g. 1-146

TABLE 11. Contaminant data, summarized by Location.
LAKE HURON, DOUBLE ISLAND

		YEAR															
		74	75	77	78	79	80	81	82	83	84	85	86	87	88		
1234-	N																
	CHLOROBENZENE	MEAN															
	STD																
1235-/ 1245-	N																
	CHLOROBENZENE	MEAN															
	STD																
PENTA-	N																
	CHLOROBENZENE	MEAN															
	STD																
HEXA-	N																
	CHLOROBENZENE	MEAN															
	STD																
	2983	.2394	.2110	.088	.0104	.0554	.0693	.0692	.0501	.0158	.0191	.0633	.0666	.044	.0194		
	.0801	.0.075	.0536	.0473	.0427	.0154	.0.025	.0092	.0158	.0191	.0191	.0191	.0191	.0191	.0191		
DDD	N	10	10	10	10	10	10	10	10	10	10	10	10	10	10		
	MEAN	.0.364	.0168	.2590	.0.114	.0.085	.0.045	.0.045	.0.045	.0.045	.0.045	.0.045	.0.045	.0.045	.0.045		
	STD	.0881	.0207	.1197	.0445	.0321	.0127	.0244	.0244	.0244	.0244	.0244	.0244	.0244	.0244	.0244	
DDE	N	10	10	10	10	10	10	10	10	10	10	10	10	10	10		
	MEAN	13.82	16.21	19.03	7.041	2.059	2.597	3.559	3.84	3.246	2.578	3.081	3.081	3.081	3.081	3.081	
	STD	6.652	8.584	15.1	2.584	.7564	1.282	1.282	1.282	1.282	1.282	1.282	1.282	1.282	1.282	1.282	
DDT	N	10	10	10	10	10	10	10	10	10	10	10	10	10	10		
	MEAN	.5547	.1710	.0900	.0.089	.0.06	.0.048	.0.048	.0.048	.0.048	.0.048	.0.048	.0.048	.0.048	.0.048	.0.048	
	STD	.2793	.0952	.0658	.0208	.0422	.0215	.0215	.0215	.0215	.0215	.0215	.0215	.0215	.0215	.0215	
DIEDRIN	N	10	10	10	10	10	10	10	10	10	10	10	10	10	10		
	MEAN	0.534	0.413	0.506	0.224	0.316	0.239	0.239	0.239	0.239	0.239	0.239	0.239	0.239	0.239	0.239	
	STD	0.156	0.1831	.2351	.1242	.1764	.1775	.0945	.1168	.1449	.1449	.1449	.1449	.1449	.1449	.1449	.1449
2378-	N																
	TETRACHLORO-	MEAN															
	DIBENZO-P-	STD															
	DIOXIN																

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*

LAKE HURON, DOUBLE ISLAND

HERRING GULL		YEAR											
		74	75	77	78	79	80	81	82	83	84	85	86
12378-	N MEAN												
PENTACHLORO- DIBENZO-P- DIOXIN	STD												
123678-	N MEAN												
HEPTACHLORO- DIBENZO-P- DIOXIN	STD												
1234678-	N MEAN												
HEPTACHLORO- DIBENZO-P- DIOXIN	STD												
123478-	N MEAN												
OCTACHLORO- DIBENZO-P- DIOXIN	STD												
2378-	N MEAN												
TETRACHLORO- DIBENZOFURAN	STD												
23478-	N MEAN												
PENTACHLORO- DIBENZOFURAN	STD												
123478- / 123467-	N MEAN												
HEPTACHLORO- DIBENZOFURAN	STD												
123678-	N MEAN												
HEPTACHLORO- DIBENZOFURAN	STD												
HEPTACHLOR EPOXIDE	N MEAN	10 0.159 0.092 0.0331	10 0.187 0.1304	10 0.099 0.0381	9 0.097 0.0427	10 0.107 0.0359	9 0.115 0.0271	10 0.111 0.0355	10 0.115 0.0271	9 0.115 0.0355	10 0.115 0.0271	10 0.0927 0.0176	10 0.149 0.0746
	STD	0.464	0.464	0.464	0.464	0.464	0.464	0.464	0.464	0.464	0.464	0.464	0.464

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*
LAKE HURON, DOUBLE ISLAND

HERRING GULL				YEAR													
	N	MEAN	STD	74	75	77	78	79	80	81	82	83	84	85	86	87	88
ALPHA-HEXACHLOROCYCLOHEXANE	N	MEAN	STD														
BETA-HEXACHLOROCYCLOHEXANE	N	MEAN	STD														
GAMMA-HEXACHLOROCYCLOHEXANE	N	MEAN	STD														
LEAD	N	MEAN	STD														
TOTAL MERCURY	N	MEAN	STD														
MIREX	N	MEAN	STD														
PHOTOMIREX	N	MEAN	STD														
CIS-NONACHLOR	N	MEAN	STD														
TRANS-NONACHLOR	N	MEAN	STD														

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g. 1-149

TABLE 11. Contaminant data, summarized by Location.^a
LAKE HURON, DOUBLE ISLAND

			YEAR														
			74	75	77	78	79	80	81	82	83	84	85	86	87	88	
OCTACHLORO-	N																
STYRENE	MEAN	STD															
PCB 1260	N	10	10	10	10	10	10	10	10	10	11	10	11	10	11	10	13
	MEAN	42.1	35.37	65.94	28.3	22.65	15.59	20.72	24.98	16.46	15.07	4.42	3.911	3.683			
	STD	12.53	11.27	41.81	8.467	6.646	6.755	6.938	12.51	5.829	5.138						.9242
PCB 1254:1260 (conversion to total PCB congener conc see pg. 39)	N	10	10	10	10	10	10	10	10	10	11	10	10	10	10	10	13
	MEAN	56.34	46.01	76.9	32.62	26.24	17.41	23.08	30.51	19.69	18.36	19.56	11.7	8.951	9.272		
	STD	16.76	14.65	48.32	9.518	7.358	7.747	7.633	15.22	6.56	6.37	5.771					2.326
SELENIUM	N																
	MEAN																
	STD																

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g. 1-150

TABLE 11. Contaminant data, summarized by Location.*
LAKE HURON, TALON ROCK

DOUBLE-CRESTED CORMORANT		YEAR	
		71	72
PERCENT LIPID IN EGG	N MEAN STD	.3 1.732	.1 6.1
HEXA-CHLOROBENZENE	N MEAN STD	.0167 .0115	.1 0.01
DDD	N MEAN STD	.1303 .2249	.1 0.07
DDE	N MEAN STD	.173 5.484	.1 5.12
DDT	N MEAN STD	.3799 .1612	.1 .0022
DIELDRIN	N MEAN STD	.3933 .1069	.1 0.01
HEPTACHLOR EPOXIDE	N MEAN STD	.0302 .0262	.1 0.03
TOTAL MERCURY	N MEAN STD	.5967 .0907	.1 0.32
PCB 1260	N MEAN STD	.248 6.986	.1 10.3

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*

LAKE HURON, AFRICA ROCK

DOUBLE-CRESTED CORMORANT		YEAR		
		73	75	79
PERCENT LIPID	N	1	2	9
IN EGG	MEAN	3.6	3.8	4.5
	STD	.1414	0.495	
ALPHA-	N	9		
CHLORDANE	MEAN	.0256		
	STD	.0151		
OXY-	N	9		
CHLORDANE	MEAN	.0533		
	STD	.0187		
HEXA-	N	9		
CHLOROBENZENE	MEAN	0.02	0.01	.0433
	STD			.0132
DDD	N	9		
	MEAN	0.26	0.15	1511
	STD		.0566	.1082
DDE	N	9		
	MEAN	15.4	7.145	2.447
	STD		.5303	.2.773
DDT	N	9		
	MEAN	1	2	9
	STD	.6928	.1006	.0394
			.0158	.0326
DIELDRIN	N	9		
	MEAN	0.49	0.525	.2767
	STD		.2616	.1618
HEPTACHLOR	N	9		
EPOXIDE	MEAN	0.1	0.05	.0567
	STD		.0283	.0377

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*
LAKE HURON, AFRICA ROCK

DOUBLE-CRESTED CORMORANT		YEAR		
		73	75	79
BETA-HEXACHLOROCYCLOHEXANE	N MEAN STD			.0156 .0085
TOTAL MERCURY	N MEAN STD	1 0.41	2 0.31	
MIREX	N MEAN STD			.1501 .1249
PHOTOMIREX	N MEAN STD			.0527 .0646
PCB 1260	N MEAN STD	1 28.3	2 9.92	9 17.75 7.506
PCB 1254;1260 (conversion to total PCB congener conc see pg. 39)	N MEAN STD			11.21 6.343 20.5 8.877

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g. 1-153

TABLE 11. Contaminant data, summarized by Location.
LAKE HURON, PUMPKIN POINT

HERRING GULL		YEAR		
		80	85	86
PERCENT LIPID	N	10	10	1
IN EGG	MEAN	7.91	9.45	8
	STD	.7937	.7878	
ALPHA-	N	10	10	1
CHLORDANE	MEAN	0.012	0.005	
	STD	.0075	.0016	
GAMMA-	N	10	10	1
CHLORDANE	MEAN	0.055	0.201	
	STD	.0016	.0114	
OXY-	N	10	10	1
CHLORDANE	MEAN	0.188	0.201	
	STD	.0014		
1234-	N	10	10	1
CHLOROBENZENE	MEAN	0.063	0.0251	
	STD	.0068	.0529	
1235-/ 1245-	N	10	10	1
CHLOROBENZENE	MEAN	0.005	0.027	
	STD	.0041	.0052	
PENTA-	N	10	10	1
CHLOROBENZENE	MEAN	0.0118	0.0093	
	STD	.0087	.0131	
HEXA-	N	10	10	1
CHLOROBENZENE	MEAN	0.899	0.0609	0.042
	STD	.0476	.0308	
DDD	N	10	10	1
	MEAN	0.015	0.005	
	STD	.0071		

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*
LAKE HURON, PUMPKIN POINT

HERRING GULL		YEAR		
		80	85	86
DDE	N MEAN STD	10 3.135 1.317	10 4.029 2.692	1 3.2
DDT	N MEAN STD		0.042 .0244	0.056
DIELDRIN	N MEAN STD		10 0.281 .1316	1 0.196
2378-	N MEAN STD		1 14	1 15
TETRACHLORO- DIBENZO-P- DIOXIN				
12378-	N MEAN STD		1 3	1 3
PENTACHLORO- DIBENZO-P- DIOXIN				
123678-	N MEAN STD		1 6	1 5
HEXACHLORO- DIBENZO-P- DIOXIN				
1234678-	N MEAN STD		1 6	1 6
HEPTACHLORO- DIBENZO-P- DIOXIN				
OCTACHLORO- DIBENZO-P- DIOXIN				
2378-	N MEAN STD		1 ND	1 ND
TETRACHLORO- DIBENZOFURAN				

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*

LAKE HURON, PUMPKIN POINT

HERRING GULL		YEAR
		80 85 86
23478-	N MEAN STD	1 3 1
PENTACHLORO- DIBENZOFURAN		
123478-/	N MEAN STD	1 ND ND
123467- HEXACHLORO- DIBENZOFURAN		
123678-	N MEAN STD	1 ND ND
HEXAACHLORO- DIBENZOFURAN		
HEPTACHLOR EPOXIDE	N MEAN STD	10 0.136 .0785
		1 0.167
ALPHA- HEXAACHLORO- CYCLOHEXANE	N MEAN STD	10 0.003 .0011
BETA- HEXAACHLORO- CYCLOHEXANE	N MEAN STD	10 .0056 .0026
		1 .0005
TOTAL MERCURY	N MEAN STD	10 0.184 .0433
MIREX	N MEAN STD	10 0.127 .1782
		10 0.118 .1032
PHOTOMIREX	N MEAN STD	1 0.066

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.
LAKE HURON, PUMPKIN POINT

HERRING GULL			YEAR		
	80	85	86		
CIS-NONACHLOR	N	1	0.059		
	MEAN				
	STD				
TRANS-	N	1.0	1		
NONACHLOR	MEAN	.0145	0.088		
	STD	.0112			
PCB 1260	N	1.0	1		
	MEAN	24.1	5.35		
	STD	12.82			
PCB 1254:1260 (conversion to total PCB congener conc see pg. 39)	N	1.0	1		
	MEAN	26.39	21.71		
	STD	13.93	10.42		

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*

LAKE MICHIGAN, ISLE AUX GALETS

CASPIAN TERN	YEAR
PERCENT LIPID IN EGG	8.8
MEAN STD	.8047
1234- CHLOROBENZENE	N 9 MEAN STD .0005
1235- / 1245- CHLOROBENZENE	N 9 MEAN STD .0005
PENTA- CHLOROBENZENE	N 9 MEAN STD .0021 .0029
HEXA- CHLOROBENZENE	N 9 MEAN STD .0376 .0252
DDE	N 9 MEAN STD 4.614 1.173
MIREX	N 9 MEAN STD .0444 .0133
PCB 1260	N 9 MEAN STD 24.67 6.236
PCB 1254:1260 (conversion to total PCB conc see pg. 39)	N 9 MEAN STD 25.9 6.539

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*
LAKE MICHIGAN, HAT ISLAND

HERRING GULL	YEAR
PERCENT LIPID	77
IN EGG	9
N	10.04
MEAN	.9071
STD	
ARSENIC	1
N	0.015
MEAN	
STD	
CADMIUM	1
N	0.005
MEAN	
STD	
ALPHA-CHLORDANE	9
N	2011
MEAN	.1152
STD	
OXY-CHLORDANE	9
N	1.234
MEAN	.9891
STD	
HEXA-CHLOROBENZENE	9
N	0.228
MEAN	.1629
STD	
DDD	9
N	2893
MEAN	.0313
STD	
DDE	9
N	27.76
MEAN	8.993
STD	
DDT	9
N	2663
MEAN	.0915
STD	

*All units measured on wet weight basis.

Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.
LAKE MICHIGAN, HAT ISLAND

HERRING GULL		YEAR
DIELDRIN	N MEAN STD	7 .7211 .5993
HEPTACHLOR EPOXIDE	N MEAN STD	9 .2622 .0909
BETA-HEXACHLOROCYCLOHEXANE	N MEAN STD	9 .0322 .0282
LEAD	N MEAN STD	1 0.15
MIREX	N MEAN STD	9 .2122 .2893
PHOTOMIREX	N MEAN STD	9 .0933 .1086
PCB 1260	N MEAN STD	9 96.48 31.24
PCB 1254:1260 (conversion to total PCB congener conc see pg. 39)	N MEAN STD	9 111.6 35.72
SELENIUM	N MEAN STD	1 0.5

All units measured on wet weight basis.

Dioxins and furans measured in pg/g; all others measured in ug/g.

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TABLE 11. Contaminant data, summarized by Location.*
LAKE MICHIGAN, HAT ISLAND

CASPIAN TERN	YEAR
PERCENT LIPID IN EGG	9 80
MEAN	8.511
STD	.5776
1234-CHLOROBENZENE	N .0005 0
MEAN	9
STD	0
1235-/ 1245-CHLOROBENZENE	N .0005 0
MEAN	9
STD	0
PENTA-CHLOROBENZENE	N .0039 .0088
MEAN	9
STD	0
HEXA-CHLOROBENZENE	N .0379 .0306
MEAN	9
STD	0
DDE	N 5.624 2.218
MEAN	9
STD	0
MIREX	N .05222 .0299
MEAN	9
STD	0
PCB 1260	N 26.51 8.818
MEAN	9
STD	0
PCB 1254:1260 (conversion to total PCB congener conc see pg. 39)	N 27.77 8.915
MEAN	9
STD	0

*All units measured on wet weight basis.

Dioxins and furans measured in pg/g; all others measured in ug/g.

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TABLE 11. Contaminant data, summarized by Location.*

LAKE MICHIGAN, GULL ISLAND

HERRING GULL		YEAR									
		78	79	80	81	82	83	84	85	87	88
PERCENT LIPID	N	10	10	10	10	10	11	10	9	11	1
IN EGG	MEAN	9.73	9.04	8.47	9.21	7.9	9.47	9.633	9	9.2	9.3
	STD	0.99	.4115	.9334	2.156	0.645	.8832	.8062			
ALPHA-	N	4	10	10	10	11	10	9	1		
CHLORDANE	MEAN	0.19	0.177	0.184	0.041	0.0309	0.021	0.0222	.0167	.0259	
	STD	.0783	.1088	.0919	.0088	.0122	.0074	.0097			
GAMMA-	N				10	11	10	9	1		
CHLORDANE	MEAN				0.019	0.039	0.048	0.067	.0016	.0012	
	STD				.0074	.0013	.0289	.0025			
OXY-	N	10	10	10	10	11	10	9	1		
CHLORDANE	MEAN	0.599	0.568	0.595	0.726	0.56	0.274	0.244	.2917	.3376	
	STD	0.36	0.209	.2725	.3059	0.196	.0911	.0557			
1234-	N				10	11	10	9	1		
CHLOROBENZENE	MEAN				0.046	0.012	0.005	0.019	.0176	.0169	
	STD				.0039	.0231	0	.0649			
1235-/ 1245-	N				10	11	10	9	1		
CHLOROBENZENE	MEAN				.0057	0.0026	0.005	0.019	.0266	.0248	
	STD				.0039	.0045	0	.0049			
PENTA-	N				10	11	10	9	1		
CHLOROBENZENE	MEAN				.0105	0.0085	0.029	0.041	.0097	.0093	
	STD				.0091	.0118	.0055	.0012	.0075		
HEXA-	N	10	10	10	10	11	10	9	1		
CHLOROBENZENE	MEAN	0.123	0.135	0.0997	.1196	0.0701	0.611	0.047	.0355	.0562	
	STD	.0521	.0544	.0279	.0193	.0388	0.016	.0071			
DDD	N	10	10	6	11	10	9	1			
	MEAN	0.242	0.219	.1017	.0291	0.135	0.02	.0098	.0098	.0096	
	STD	.1095	.0862	.0371	.0247	0.01	.0087				

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.
LAKE MICHIGAN, GULL ISLAND

HERRING GULL				YEAR							
	78	79	80	81	82	83	84	85	87	88	
DDE	N MEAN STD	10 22.91 8.306	10 14.72 4.764	10 12.95 6.484	10 13.84 3.829	11 6.371 1.372	10 5.921 2.335	9 1.589	1 3.95	1 6.108	1
DDT	N MEAN STD	10 0.119 .0599	10 0.107 .0476	10 0.196 0.086	10 0.167 .0629	11 0.0436 .0304	10 0.025 .0178	9 0.0356 0.024	1 0.074	1 .1043	1
DIELDRIN	N MEAN STD	10 0.83 .3653	10 0.716 .3151	10 0.748 0.34	10 0.876 .2814	11 .6827 .3296	10 0.411 .1269	9 .3989 .1405	1 .3271	1 .5464	1
2378-TETRACHLORO-DIBENZO-P-DIOXIN	N MEAN STD				1 58	1 23	1 10	1 12	1 12	1 17	1
12378-PENTACHLORO-DIBENZO-P-DIOXIN	N MEAN STD				1 31	1 26	1 8	1 13	1 11	1 7	14
123678-HEPTACHLORO-DIBENZO-P-DIOXIN	N MEAN STD				1 32	1 24	1 9	1 12	1 10	1 11	17
1234678-HEPTACHLORO-DIBENZO-P-DIOXIN	N MEAN STD				1 ND	1 ND	1 ND	1 ND	1 ND	1 ND	6
OCTACHLORO-DIBENZO-P-DIOXIN	N MEAN STD				1 21	1 10	1 8	1 10	1 10	1 ND	4
2378-TETRACHLORO-DIBENZOFURAN	N MEAN STD							1 4	1 2	1 2	1

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*
LAKE MICHIGAN, GULL ISLAND

HERRING GULL		YEAR									
		78	79	80	81	82	83	84	85	87	88
23478-	N MEAN STD										
PENTACHLORO- DIBENZOFURAN	N MEAN STD										
123478-/	N MEAN STD										
123467-/ HEXACHLORO- DIBENZOFURAN	N MEAN STD										
123678-/ HEXACHLORO- DIBENZOFURAN	N MEAN STD										
HEPTACHLOR EPOXIDE	N MEAN STD	0.296 .1025	.3338 .1433	.332 .1309	8 10	10 .1504	0.411 .0762	.2627 .0709	.176 .0522	.1867 .2341	.3155 .1
ALPHA- HEXACHLORO- CYCLOHEXANE	N MEAN STD										
BETA- HEXACHLORO- CYCLOHEXANE	N MEAN STD	0.018 .0103	0.014 .0007	0.011 .0032	10 10	10 .0049	0.062 0	0.01 .0024	0.032 .0022	0.061 0	0.028 .0023
GAMMA- HEXACHLORO- CYCLOHEXANE	N MEAN STD										
TOTAL MERCURY	N MEAN STD										

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g. 1-164

TABLE 11. Contaminant data, summarized by Location.*
LAKE MICHIGAN, GULL ISLAND

HERRING GULL			YEAR								
	78	79	80	81	82	83	84	85	87	88	
MIREX	N MEAN STD	10 0.157 .1017	10 0.146 .149	10 0.141 .1345	10 0.106 .0783	11 0.0618 .0412	10 0.055 .0585	9 .0417 .0294	1 .0622 .0294	1 0.035 0.035	
PHOTOMIREX	N MEAN STD	9 .0633 .0332	10 0.073 .0542						.0177 1	.0104 1	
CIS-NONACHLOR	N MEAN STD								.0618 1	.0824 1	
TRANS- NONACHLOR	N MEAN STD				10 0.117 .0371	11 0.0273 .0162	10 0.018 .0103	9 .0122 .0067	.0947 1	.1503 1	
OCTACHLORO- STYRENE	N MEAN STD								.0103 1	.0075 1	
PCB 1260	N MEAN STD	10 74.91 31.83	10 84.03 32.93	10 51.49 20.33	10 60.54 28.95	11 28.35 17.08	10 24.72 6.301	10 17.08 6.301	10 5.891 1	10 7.462 1	
PCB 1254:1260 (conversion to total PCB congener conc see pg. 39)	N MEAN STD	10 91.49 36.86	10 92.93 35.87	10 58.7 23.07	10 63.93 29.78	11 32.65 19.2	10 28.93 7.435	10 26.51 7.36	9 16.58 16.58	1 21.66 21.66	

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*

LAKE MICHIGAN, BELLOWS ISLAND

HERRING GULL		YEAR
PERCENT LIPID IN EGG	N MEAN	10 9.8
	STD	1.111
ALPHA-CHLORDANE	N MEAN	.2417 0.088
OXY-CHLORDANE	N MEAN	10 0.614
	STD	.5417
HEXA-CHLOROBENZENE	N MEAN	10 0.134
	STD	0.085
DDE	N MEAN	10 23.17
	STD	9.864
DDT	N MEAN	10 0.202
	STD	.0531
DIELDRIN	N MEAN	10 0.892
	STD	.3799
HEPTACHLOR EPOXIDE	N MEAN	10 0.355
	STD	.1514
BETA-HEXACHLOROCYCLOHEXANE	N MEAN	10 .0265
	STD	.0249

*All units measured on wet weight basis.

Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*
LAKE MICHIGAN, BELLows ISLAND

HERRING GULL		YEAR	
MIREX	N MEAN STD	10 0.33 .5966	78
PHOTOMIREX	N MEAN STD	10 0.141 .2309	
PCB 1260	N MEAN STD	10 83.3 36.38	
PCB 1254:1260 (conversion to total PCB congener conc see pg. 39)	N MEAN STD	10 101.1 46.06	

*All units measured on wet weight basis.

Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11: Contaminant data, summarized by Location.
LAKE MICHIGAN, TROUT ISLAND

HERRING GULL	YEAR
PERCENT LIPID IN EGG	86
MEAN	1 7.9
STD	
ALPHA-CHLORDANE	N MEAN STD
0.039	1
OXY-CHLORDANE	N MEAN STD
0.361	1
HEXA-CHLOROBENZENE	N MEAN STD
0.084	1
DDD	N MEAN STD
0.018	1
DDE	N MEAN STD
7.91	1
DDT	N MEAN STD
0.152	1
DIELDRIN	N MEAN STD
0.488	1

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g. 1-168

TABLE 11. Contaminant data, summarized by Location.*
LAKE MICHIGAN, TROUT ISLAND

HERRING GULL	YEAR
2378-	N MEAN STD
TETRACHLORO- DIBENZO-P- DIOXIN	1 20
12378- PENTACHLORO- DIBENZO-P- DIOXIN	1 23
123678- HEXACHLORO- DIBENZO-P- DIOXIN	1 20
1234678- HEPTACHLORO- DIBENZO-P- DIOXIN	1 6
OCTACHLORO- DIBENZO-P- DIOXIN	1 10
2378- TETRACHLORO- DIBENZOFURAN	1 2
23478- PENTACHLORO- DIBENZOFURAN	1 17
123478- / 123467- HEXAACHLORO- DIBENZOFURAN	1 4
123678- HEXAACHLORO- DIBENZOFURAN	1 4

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

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TABLE 11. Contaminant data, summarized by Location.*

LAKE MICHIGAN, TROUT ISLAND

		YEAR
HERRING GULL		86
HEPTACHLOR	N MEAN STD	1 0.338
BETA-HEXACHLOROCYCLOHEXANE	N MEAN STD	.0005
MIREX	N MEAN STD	1 0.091
PHOTOMIREX	N MEAN STD	1 .0005
CIS-NONACHLOR	N MEAN STD	1 0.102
TRANS-NONACHLOR	N MEAN STD	1 0.122
PCB 1260	N MEAN STD	1 9.72
PCB 1254:1260 (conversion to total PCB congener conc see pg. 39)	N MEAN STD	1 27.5

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g. 1-170

TABLE 11. Contaminant data, summarized by Location.*
LAKE MICHIGAN, FISH ISLAND

HERRING GULL	YEAR
PERCENT LIPID IN EGG	84
MEAN	1
STD	9.8
ALPHA-CHLORDANE	N
MEAN	0.02
STD	1
GAMMA-CHLORDANE	N
MEAN	0.005
STD	1
OXY-CHLORDANE	N
MEAN	0.31
STD	1
1234-CHLOROBENZENE	N
MEAN	0.005
STD	1
1235-/ 1245-CHLOROBENZENE	N
MEAN	0.006
STD	1
PENTA-CHLOROBENZENE	N
MEAN	0.006
STD	1
HEXA-CHLOROBENZENE	N
MEAN	0.059
STD	1
DDD	N
MEAN	0.01
STD	1

*All units measured on wet weight basis.

Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*
LAKE MICHIGAN, FISH ISLAND

HERRING GULL	YEAR
DDE	N 8.5 MEAN 1 STD 84
DDT	N 0.1 MEAN 0.02 STD
DTELDRIN	N 0.1 MEAN 0.38 STD
ALPHA-HEXACHLOROCYCLOHEXANE	N 1 MEAN .0025 STD
BETA-HEXACHLOROCYCLOHEXANE	N 1 MEAN .0025 STD
HEPTACHLOR EPOXIDE	N 0.18 MEAN 0.025 STD
MIREX	N 0.1 MEAN 0.04 STD
TRANS-NONACHLOR	N 1 MEAN 0.03 STD
PCB 1260	N 1 MEAN 32.1 STD

*All units measured on wet weight basis.

Dioxins and furans measured in pg/g; all others measured in ug/g.

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TABLE 11. Contaminant data, summarized by Location.
LAKE MICHIGAN, FISH ISLAND

HERRING GULL	YEAR
	84
PCB 1254:1260 N	
(conversion	MEAN
to total PCB	STD
congener conc	
see pg. 39)	

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

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TABLE 11. Contaminant data, summarized by Location.

LAKE MICHIGAN, GRAVEL ISLAND

HERRING GULL	YEAR
PERCENT LIPID IN EGG	84
N MEAN	1
STD	9.5
ALPHA-CHLORDANE	N MEAN 0.04
STD	0.1
GAMMA-CHLORDANE	N MEAN 0.01
STD	0.1
OXY-CHLORDANE	N MEAN 0.45
STD	0.45
1234-CHLOROBENZENE	N MEAN 0.005
STD	0.005
1235-/ 1245-CHLOROBENZENE	N MEAN 0.005
STD	0.005
PENTA-CHLOROBENZENE	N MEAN 0.007
STD	0.007
HEXA-CHLOROBENZENE	N MEAN 0.06
STD	0.06
DDD	N MEAN 0.01
STD	0.01

*All units measured on wet weight basis.

Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*
LAKE MICHIGAN, GRAVEL ISLAND

HERRING GULL		YEAR
DDE	N MEAN STD	1 8.67 84
DDT	N MEAN STD	1 0.04
DIELDRIN	N MEAN STD	1 0.7
HEPTACHLOR EPOXIDE	N MEAN STD	1 0.25
ALPHA- HEXACHLORO- CYCLOHEXANE	N MEAN STD	1 .0025
BETA- HEXACHLORO- CYCLOHEXANE	N MEAN STD	1 0.01
MIREX	N MEAN STD	1 0.06
TRANS- NONACHLOR	N MEAN STD	1 0.05
PCB 1260	N MEAN STD	1 34.9

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.
LAKE MICHIGAN, GRAVEL ISLAND

HERRING GULL	YEAR
	84
PCB 1254:1260 N	1
(conversion	MEAN
to total PCB	44.1
congener conc	
see pg. 39)	

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

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TABLE 11. Contaminant data, summarized by Location.*
LAKE MICHIGAN, SPIDER ISLAND

HERRING GULL		YEAR
PERCENT LIPID IN EGG	N	84
	MEAN	1
	STD	7.7
ALPHA-CHLORDANE	N	0.03
	MEAN	1
	STD	0.01
GAMMA-CHLORDANE	N	0.41
	MEAN	1
	STD	0.41
OXY-CHLORDANE	N	0.002
	MEAN	1
	STD	0.002
1,2,3,4-CHLOROBENZENE	N	0.008
	MEAN	1
	STD	0.008
1,2,3,5-/1,2,4,5-CHLOROBENZENE	N	0.005
	MEAN	1
	STD	0.005
PENTA-CHLOROBENZENE	N	0.061
	MEAN	1
	STD	0.061
HEXA-CHLOROBENZENE	N	0.01
	MEAN	1
	STD	0.01
DDD	N	0.01
	MEAN	1
	STD	0.01

*All units measured on wet weight basis.

Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.

LAKE MICHIGAN, SPIDER ISLAND

HERRING GULL	YEAR	
DDE	N MEAN STD	1 7.16 0.03
DDT	N MEAN STD	1 0.1 0.03
DIELDRIN	N MEAN STD	1 0.46 0.46
HEPTACHLOR EPOXIDE	N MEAN STD	1 0.22 0.22
ALPHA- HEXAChLORO- CYCLOHEXANE	N MEAN STD	1 .0025 .0025
BETA- HEXAChLORO- CYCLOHEXANE	N MEAN STD	1 0.01 0.01
MIREX	N MEAN STD	1 0.02 0.02
TRANS- NONACHLOR	N MEAN STD	1 0.04 0.04
PCB 1260	N MEAN STD	1 31.2 31.2

*All units measured on wet weight basis.

Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*
LAKE MICHIGAN, SPIDER ISLAND

HERRING GULL	YEAR
	84
PCB 1254:1260 (conversion to total PCB congener conc see pg. 39)	N MEAN STD
	1 37.4

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g. 1-179.

TABLE 11. Contaminant data, summarized by Location.

LAKE MICHIGAN, GRAVELLY ISLAND

CASPIAN TERN	YEAR
	80
PERCENT LIPID IN EGG	N MEAN STD
1234-CHLOROBENZENE	N MEAN STD
1235-/ 1245-CHLOROBENZENE	N MEAN STD
PENTA-CHLOROBENZENE	N MEAN STD
HEXA-CHLOROBENZENE	N MEAN STD
DDE	N MEAN STD
MIREX	N MEAN STD
PCB 1260	N MEAN STD
PCB 1254:1260 (conversion to total PCB congener conc see pg. 39)	N MEAN STD

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.
LAKE MICHIGAN, LITTLE SISTER ISLAND

HERRING GULL		YEAR	
PERCENT LIPID IN EGG		77	
MEAN	10 9.96		
STD	.9812		
ARSENIC	N MEAN STD	1 0.015	
CADMIUM	N MEAN STD	1 0.017	
ALPHA-CHLORDANE	N MEAN STD	10 0.143 .0495	
OXY-CHLORDANE	N MEAN STD	10 1.028 .3256	
HEXA-CHLOROBENZENE	N MEAN STD	10 .2565 .1034	
DDD	N MEAN STD	10 0.364 .0963	
DDE	N MEAN STD	10 30.59 12.58	
DDT	N MEAN STD	10 3.077 .1964	

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.

LAKE MICHIGAN, LITTLE SISTER ISLAND

		YEAR
HERRING GULL		77
DIELDRIN	N MEAN STD	10 0.646 .2114
HEPTACHLOR EPOXIDE	N MEAN STD	10 0.278 .0853
BETA-HEXAChLOROCYCLOHEXANE	N MEAN STD	10 0.02 .0141
LEAD	N MEAN STD	1 0.051
MIREX	N MEAN STD	10 0.07 .0416
PHOTOMIREX	N MEAN STD	10 0.039 .0179
PCB 1260	N MEAN STD	10 89.99 27.07
PCB 1254:1260 (conversion to total PCB congener conc see pg. 39)	N MEAN STD	10 104.4 32.41
SELENIUM	N MEAN STD	1 1.3

*All units measured on wet weight basis.

Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.
LAKE MICHIGAN, BIG SISTER ISLAND

HERRING GULL		YEAR															
		71	72	73	74	75	76	77	78	79	80	82	83	84	85	86	
PERCENT LIPID IN EGG	N MEAN STD	9.511 .6936	1.1 .6477	10.8 8.3	1.712 1.282	1.1 1.388	10.8.1 9.12 1.388	1.1 2.04	10.9.9 0.978	1.10 8.31 1.088	1.10 8.94 1.088	1.10 9.03 1.088	1.10 9.02 1.088	1.10 9.89 1.088	1.10 9.555 1.088	1.10 9.89 1.088	
ALPHA-CHLORDANE	N MEAN STD						0.213 .0769	10.0.1505 .1729	1.10 0.193 .0429	1.10 0.13 .0097	1.10 0.026 .0097	1.10 0.019 .0032	1.10 0.019 .0094	1.10 0.04 .0094	1.10 0.041 .0099		
GAMMA-CHLORDANE	N MEAN STD																
OXY-CHLORDANE	N MEAN STD	10.0.723 .2704	10.0.648 .3351	10.0.618 .2371	10.0.561 .3903	10.0.518 .2616	10.0.609 .2731	10.0.609 .523	10.0.879 0.487	10.0.487 0.178	10.0.429 0.178	10.0.34 0.178	10.0.34 0.178	10.0.292 0.178	10.0.292 0.178		
1,2,3,4-CHLOROBENZENE	N MEAN STD	10.0.298 .0503	10.0.046 .0064	10.0.158 .0262	10.0.008 .0008	10.0.002 .0007	10.0.008 .0008	10.0.002 .0008	10.0.013 .0008	10.0.013 .0008	10.0.012 .0008	10.0.012 .0008	10.0.012 .0008	10.0.0221 .0005	10.0.0221 .0005		
1,2,3,5-/ 1,2,4,5-CHLOROBENZENE	N MEAN STD	10.0.142 .0171	10.0.024 .0042	10.0.057 .0089	10.0.001 .0014	10.0.001 .0021	10.0.001 .0014	10.0.001 .0021	10.0.022 .0018	10.0.022 .0018	10.0.012 .0021	10.0.012 .0021	10.0.012 .0021	10.0.026 .0048	10.0.026 .0048		
PENTA-CHLOROBENZENE	N MEAN STD	10.0.0736 .11.87	10.0.0131 .0139	10.0.0191 .0217	10.0.0191 .0217	10.0.051 .0014	10.0.051 .0014	10.0.051 .0021	10.0.032 .0021	10.0.032 .0009	10.0.032 .0009	10.0.032 .0009	10.0.032 .0009	10.0.048 .0059	10.0.048 .0059		
HEXA-CHLOROBENZENE	N MEAN STD	10.0.4233 .6307	10.0.0477 .0598	10.0.1417 .0515	10.0.121 .0747	10.0.132 .0234	10.0.0665 .0178	10.0.0665 .0178	10.0.0316 .0007	10.0.0316 .0007	10.0.0618 .0178	10.0.0618 .0178	10.0.0618 .0178	10.0.0488 .0337	10.0.0488 .0337		
DDD	N MEAN STD	10.0.159 .0567	10.0.103 .0552	10.0.25 .1246	10.0.25 .1246	10.0.192 .041	10.0.489 .0285	10.0.489 .0103	10.0.017 .0103	10.0.017 .0103	10.0.022 .0103	10.0.022 .0103	10.0.046 .0107	10.0.046 .0107			

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g. 1-183

TABLE 11. Contaminant data, summarized by Location.

LAKE MICHIGAN, BIG SISTER ISLAND

		YEAR														
HERRING GULL		71	72	73	74	75	76	77	78	79	80	82	83	84	85	86
DDE	N	10		10		10		10		10		10		10		10
	MEAN	60.98		54.36		33.4		21.8		11.79		11.38		6.761		9.338
	STD	33.79		15.99		10.34		8.001		6.082		2.606		5.808		7.934
DDT	N	10		10		10		10		10		10		10		10
	MEAN	0.983		0.696		0.272		0.144		0.09		0.169		0.077		0.06
	STD	.4331		.2066		.1855		.049		.0678		.0468		.0177		.0254
DIELDRIN	N	10		10		10		10		10		10		10		10
	MEAN	0.832		0.593		0.82		0.904		0.544		0.654		0.747		0.639
	STD	.3813		.3482		.3531		.5749		.3157		.2193		.3793		.1519
2378-	N	1		1		1		1		1		1		1		1
TETRACHLORO-	MEAN	249		70		58		40		54		60		24		45
DIBENZO-P-	STD															
12378-	N	1		1		1		1		1		1		1		1
PENTACHLORO-	MEAN	38		31		28		25		31		25		17		20
DIBENZO-P-	STD															
DIOXIN																
123678-	N	1		1		1		1		1		1		1		1
HEXACHLORO-	MEAN	69		52		53		40		47		45		23		31
DIBENZO-P-	STD															
DIOXIN																
1234678-	N	1		1		1		1		1		1		1		1
HEPTACHLORO-	MEAN	12		6		9		5		6		7		6		6
DIBENZO-P-	STD															
DIOXIN																
OCTACHLORO-	N	1		1		1		1		1		1		1		1
DIBENZO-P-	MEAN	40		109		92		36		39		62		31		31
DIOXIN	STD															
2378-	N	1		1		1		1		1		1		1		1
TETRACHLORO-	MEAN	2		2		3		2		3		2		3		3
DIBENZOFURAN	STD															

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*
LAKE MICHIGAN, BIG SISTER ISLAND

		YEAR													
		71	72	73	74	76	77	78	79	80	82	83	84	85	86
HERRING GULL															
23478- / 123467- PENTACHLORO- DIBENZOFURAN	N MEAN STD	1 23	1 22	1 16	1 15	1 15	1 12			1 13	1 11	1 21	1 9	1 9	
123478- / 123467- HEXAACHLORO- DIBENZOFURAN	N MEAN STD	1 4	1 ND	1 4	1 4	1 4	1 4			1 4	1 4	1 4	1 4	1 4	
123678- HEXAACHLORO- DIBENZOFURAN	N MEAN STD	1 5	1 6	1 4	1 5	1 4	1 4			1 5		1 4	1 4	1 4	
HEPTACHLOR EPOXIDE	N MEAN STD	10 0.391 0.1554	10 0.418 0.1259	10 0.401 .1211	8 .1269	0.245 .1215	0.359 .0956	0.383 .1451	0.201 .0605	0.304 .0.094	0.236 .0578	0.24			
ALPHA- HEXAACHLORO- CYCLOHEXANE	N MEAN STD								10 .0038	10 .0055	10 .0026	10 0	10 .0078		
BETA- HEXAACHLORO- CYCLOHEXANE	N MEAN STD	10 0.026 .0241	10 0.016 .0097	10 0.023 .021	10 .0247	10 .0067	10 .0105	10 .0058	10 .0037	10 0.01	10 .0115	10 .0005	1 .0103		
TOTAL MERCURY	N MEAN STD								10 .037	10 .168	10 .1702	10 .0408	10 .0395		
MIREX	N MEAN STD	10 0.679 1.437	10 0.357 0.54	10 0.214 .3111	10 0.256 .4983	10 0.312 .0439	10 0.068 .0287	10 0.07 .0389	10 0.044 .2422	10 0.133 .24737	10 0.182 .4737	10 0.182 .2422	10 0.052 .4737	1 .0005	
PHOTOMIREX	N MEAN STD								10 0.096 .0837	10 0.137 .2205					

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g. 1-185

TABLE 11. Contaminant data, summarized by Location.*

LAKE MICHIGAN, BIG SISTER ISLAND

HERRING GULL		YEAR											
		71	72	73	74	76	77	78	79	80	82	83	84
CIS-NONACHLOR	N												
	MEAN												
	STD												
TRANS-	N												
NONACHLOR	MEAN												
	STD												
OCTACHLORO-	N												
STYRENE	MEAN												
	STD												
PCB 1260	N	10	10	10	10	10	10	10	10	10	10	10	10
	MEAN	134.1	155.8	110.1	70.49	69.81	50.79	57.57	24.21	29.4	29.4	29.4	29.4
	STD	64.42	51.28	26.4	26.92	35.91	10.38	16.63	8.295	9.51	9.51	9.51	9.51
PCB 1254:1260 (conversion to total PCB congener conc see pg. 39)	N	10	10	10	10	10	10	10	10	10	10	10	10
	MEAN	141.7	165.3	118.4	89.98	73.49	56.95	66.89	27.66	34.36	36.82	36.82	36.82
	STD	64.04	50.23	28.29	36.78	36.87	12.06	23.38	9.481	11.15	37.21	37.21	37.21

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g. 1-186

TABLE 11. Contaminant data, summarized by Location.
LAKE MICHIGAN, BIG SISTER ISLAND

HERRING GULL	YEAR
PERCENT LIPID IN EGG	87 1 88
MEAN	1 1
STD	10.45 7.74
ALPHA-CHLORDANE	.0258 .0095
MEAN	1 1
STD	.0013 .0004
GAMMA-CHLORDANE	1 1
MEAN	.5388 .1445
OXY-CHLORDANE	1 1
MEAN	.0169 .0111
1234-CHLOROBENZENE	1 1
MEAN	.0247 .0164
1235-/1245-CHLOROBENZENE	1 1
MEAN	.0028 .0054
PENTA-CHLOROBENZENE	1 1
MEAN	.0749 .0337
HEXA-CHLOROBENZENE	1 1
MEAN	.0221 .0071
DDD	1 1
MEAN	
STD	

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*
LAKE MICHIGAN, BIG SISTER ISLAND

HERRING GULL		YEAR	
DDE	N MEAN STD	87 12.31 3.966	88 1 1
DDT	N MEAN STD	N .1338 .0467	N 1 1
DIEDDRIN	N MEAN STD	N .8502 .5551	N 1 1
2378- TETRACHLORO- DIBENZO-P- DIOXIN	N MEAN STD	N 26 10	N 1 1
12378- PENTACHLORO- DIBENZO-P- DIOXIN	N MEAN STD	N 21 9	N 1 1
123678- HEPTACHLORO- DIBENZO-P- DIOXIN	N MEAN STD	N 29 15	N 1 1
1234678- HEPTACHLORO- DIBENZO-P- DIOXIN	N MEAN STD	N 6 3	N 1 1
OCTACHLORO- DIBENZO-P- DIOXIN	N MEAN STD	N 10 5	N 1 1
2378- TETRACHLORO- DIBENZOFURAN	N MEAN STD	N 3 3	N 1 1

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*
LAKE MICHIGAN, BIG SISTER ISLAND

HERRING GULL		YEAR	
		87	88
23478-	N	1	1
PENTACHLORO-	MEAN	1	1
DIBENZOFURAN	STD	11	
123478- /	N	1	1
123467-	MEAN	4	ND
HEXACHLORO-	STD		
DIBENZOFURAN			
123678-	N	1	1
HEXACHLORO-	MEAN	4	ND
DIBENZOFURAN	STD		
HEPTACHLOR	N	1	1
EPOXIDE	MEAN	.6078	.2015
	STD		
ALPHA-	N	1	1
HEXACHLORO-	MEAN	.0022	.0009
CYCLOHEXANE	STD		
BETA-	N	1	1
HEXACHLORO-	MEAN	.0051	.0012
CYCLOHEXANE	STD		
GAMMA-	N	1	1
HEXACHLORO-	MEAN	0.002	.0008
CYCLOHEXANE	STD		
TOTAL MERCURY	N		
	MEAN		
	STD		
MIREX	N	1	1
	MEAN	.0961	.0348
	STD		

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.
LAKE MICHIGAN, BIG SISTER ISLAND

HERRING GULL		YEAR	
		87	88
PHOTOMIREX	N MEAN STD	.0475 1 .0191	1 1
CIS-NONACHLOR	N MEAN STD	.1134 1 .047	1 1
TRANS- NONACHLOR	N MEAN STD	.1701 1 .074	1 1
OCTACHLORO- STYRENE	N MEAN STD	.0086 1 .0045	1 1
PCB 1260	N MEAN STD	15.05 1 5.637	1 1
PCB 1254:1260 (conversion to total PCB congener conc see pg. 39)	N MEAN STD	44.52 1 16.61	1 1

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g. 1-190

TABLE 11. Contaminant data, summarized by Location.*
LAKE MICHIGAN, GREEN BAY, HAT ISLAND

HERRING GULL		YEAR	
PERCENT LIPID	N IN EGG	1 8.7	
	MEAN STD		
ALPHA-CHLORDANE	N MEAN STD	1 0.02	
GAMMA-CHLORDANE	N MEAN STD	1 0.005	
OXY-CHLORDANE	N MEAN STD	1 0.39	
1,2,3,4-CHLOROBENZENE	N MEAN STD	1 0.001	
1,2,3,5-/ 1,2,4,5-CHLOROBENZENE	N MEAN STD	1 0.005	
PENTA-CHLOROBENZENE	N MEAN STD	1 0.006	
HEXA-CHLOROBENZENE	N MEAN STD	1 0.053	
DDD	N MEAN STD	1 0.01	

*All units measured on wet weight basis.

Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*

LAKE MICHIGAN, GREEN BAY, HAT ISLAND

HERRING GULL	YEAR	
DDE	84	
DDE	N MEAN STD	7.14 1 0.03
DDT	N MEAN STD	1 0.49 0.22
DIELDRIN	N MEAN STD	1 0.49 0.025
HEPTACHLOR EPOXIDE	N MEAN STD	1 0.22 0.0025
ALPHA- HEXACHLORO- CYCLOHEXANE	N MEAN STD	1 0.01 0.04
BETA- HEXACHLORO- CYCLOHEXANE	N MEAN STD	1 0.01 0.03
MIREX	N MEAN STD	1 25.5
TRANS- NONACHLOR	N MEAN STD	1 25.5
PCB 1260	N MEAN STD	1 25.5

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*
LAKE MICHIGAN, GREEN BAY, HAT ISLAND

HERRING GULL	YEAR

	84
PCB 1254:1260	N
(conversion	MEAN
to total PCB	STD
congener conc	
see pg. 39)	

*All units measured on wet weight basis. Dioxins and furans measured in ug/g; all others measured in pg/g. 1-193

TABLE 11. Contaminant data, summarized by Location.
LAKE SUPERIOR, CHENE ISLAND

HERRING GULL	YEAR
PERCENT LIPID IN EGG	83
MEAN	1
STD	8.5
OXY-CHLORDANE	N
MEAN	0.134
STD	1
HEXA-CHLOROBENZENE	N
MEAN	0.053
STD	1
DDD	N
MEAN	0.018
STD	1
DDE	N
MEAN	2.74
STD	1
DIELDRIN	N
MEAN	0.247
STD	1
HEPTACHLOR EPOXIDE	N
MEAN	0.133
STD	1
MIREX	N
MEAN	0.126
STD	1
PCB 1254:1260 (conversion to total PCB congener conc see pg. 39)	N
MEAN	14.5
STD	14.5

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*
LAKE SUPERIOR, MAMMAINSE HARBOUR

HERRING GULL		YEAR			
PERCENT LIPID	N	74	75	77	78
IN EGG	MEAN	10	10	10	8
	STD	8.68	7.24	9.25	9.263
		1.005	1.403	9.144	.8141
ALPHA-	N	10	5		
CHLORDANE	MEAN	0.031	0.068		
	STD	.0218	.0858		
OXY-	N	10	8		
CHLORDANE	MEAN	.3530	.3675		
	STD	.0874	.3819		
HEXA-	N	10	10		
CHLOROBENZENE	MEAN	.2869	.2356		
	STD	.1287	.0817		
		.0875	.0631		
		.0489			
DDD	N	10	10		
	MEAN	.2828	.1141		
	STD	.0659	.0577		
		.2140	.1431		
DDE	N	10	10		
	MEAN	14.19	22.03		
	STD	4.115	8.601		
		12.01	9.683		
DDT	N	10	10		
	MEAN	.8435	.7219		
	STD	.4802	.6690		
		.0975	.0545		
		.1004			
DIELDRIN	N	10	10		
	MEAN	0.419	0.319		
	STD	.1489	.1081		
		0.403	.3975		
HEPTACHLOR	N	10	10		
EPOXIDE	MEAN	0.126	0.136		
	STD	.0201	.0552		
		0.128	0.135		
		.0416	.0067		

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.
LAKE SUPERIOR, MAMMAINE HARBOUR

HERRING GULL			YEAR			
	N		74	75	77	78
BETA-HEXACHLORO-CYCLOHEXANE	MEAN				0.10	8
	STD				0.025	.0213
					.0201	.0155
TOTAL MERCURY	N		10	10		
	MEAN	0.368	0.396			
	STD	.0727	.1388			
MIREX	N		10	10		
	MEAN	0.759	1.292	0.415	8	
	STD	0.665	1.721	.7906	.1565	
PHOTOMIREX	N				10	8
	MEAN				0.179	.0613
	STD				.2823	.0484
PCB 1260	N		10	10		
	MEAN	37.32	54.29	46.52	8	
	STD	7.441	29.28	15.46	31.1	
PCB 1254:1260 (conversion to total PCB congener conc see pg. 39)	N				13.05	
	MEAN	50.07	70.45	55.53	8	
	STD	9.984	37.47	20.22	36.85	
					15.78	

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*
LAKE SUPERIOR, AGAWA ROCK

HERRING GULL				YEAR										
				78	79	80	81	82	83	84	85	86	87	88
PERCENT LIPID IN EGG	N	10 9.74 1.139	10 9.29 0.74	10 8.32 1.068	10 8.91 1.121	10 8.933 1.231	12 9.3 .6867	10 9.3 .7528	10 9.66 .7834	10 7.8 .0058	10 0.015 .0053	10 0.006 .0088	1 9.2 .0016	1 9.6 .0146
MEAN	MEAN	0.12 0.152 .0872	0.06 0.0867 .0132	0.204 0.0643	0.0229 .0138	0.0141 .0058	0.019 .0088	0.015 .0053	0.015 .0053	0.015 .0053	0.015 .0053	0.016 .0016	1 1 .0016	
STD	STD	.0872	.0132											
ALPHA-CHLORDANE	N	7 0.12 .0872	10 0.152 0.06	9 0.0867 .0132	10 0.204 .0643	7 0.0229 .0138	11 0.0141 .0058	10 0.019 .0088	10 0.015 .0053	10 0.015 .0053	10 0.015 .0053	10 0.015 .0053	1 1 .0016	1 1 .0016
GAMMA-CHLORDANE	N													
OXY-CHLORDANE	N	10 0.277 .1676	10 0.438 .3346	10 0.23 .2529	10 0.28 .1511	10 0.336 .1794	12 0.2678 .0.114	10 0.208 .0.0567	10 0.199 .1124	10 0.199 .0.1124	10 0.199 .0.1124	10 0.199 .0.1124	1 1 .172	1 1 .1628
123-CHLOROBENZENE	N													
124-CHLOROBENZENE	N	10 0.001 0	10 0.001 0	10 0.0049 .0027	10 0.0049 .0027	10 0.0057 .0063	10 0.0057 .0129	10 0.002 .0019	10 0.002 .0234	10 0.002 .0004	10 0.002 .0004	10 0.002 .0004	1 1 .0175	1 1 .0175
135-CHLOROBENZENE	N													
1234-CHLOROBENZENE	N													
1235-/ 1245-CHLOROBENZENE	N													

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*

LAKE SUPERIOR, AGAWA ROCK

		YEAR										
HERRING GULL		78	79	80	81	82	83	84	85	86	87	88
PENTA-CHLOROBENZENE	N MEAN	10	10	10	10	10	11	10	10	10	1	1
	STD	.0219 .0145	.0098 .0043	.0136 .0104	.0099 .0034	.0038 .0003	.0007 .0061	.0044 .0056			.0097 .0103	
HEXA-CHLOROBENZENE	N MEAN	10	10	10	10	10	12	10	10	1	1	1
	STD	.0105 .0617	.0142 .077	.0802 .0198	.1413 .0866	.0956 .0284	.0545 .0589	.055 .0206	.0478 .0075	.048 .0075	.0378 .0474	
DDD	N MEAN	10	10	10	10	10	12	10	10	1	1	1
	STD	0.183 0.093	0.106 .0515	0.066 .0288	0.133 .0658	0.155 .0085	0.017 .0175	0.017 .0052	0.016 .0052	.0005 .0005	.0035 .0007	
DDE	N MEAN	10	10	10	10	10	12	10	10	1	1	1
	STD	8.459 4.953	7.264 5.408	3.702 3.545	6.256 3.087	5.831 2.188	3.238 1.079	2.485 8452	2.965 0.705	3.13	2.15	2.708
DDT	N MEAN	10	10	10	10	10	11	10	10	1	1	1
	STD	0.1 0.044	0.086 0.0443	0.154 .1343	0.054 0.025	0.107 .0514	0.0245 .0197	0.015 .0053	0.075 .0163	0.075 .0163	.0332 .0963	
DIELDRIN	N MEAN	10	10	10	10	10	12	10	10	1	1	1
	STD	0.422 .1812	0.559 .3131	0.351 .2088	0.494 .3158	0.344 .1541	0.3288 .1245	0.34 0.08	0.356 0.117	0.316 .0117	.1286 .1286	.3737
2378-TETRACHLORODIBENZO-P-DIOXIN	N MEAN											
	STD											
12378-PENTACHLORODIBENZO-P-DIOXIN	N MEAN											
	STD											
123678-HEXAACHLORODIBENZO-P-DIOXIN	N MEAN											
	STD											

* All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*

LAKE SUPERIOR, AGAWA ROCK

		YEAR										
		78	79	80	81	82	83	84	85	86	87	88
HERRING GULL												
1234678-	N											
HEPTACHLORO-	MEAN											
DIBENZO-P-	STD											
DIOXIN												
OCTACHLORO-	N											
DIBENZO-P-	MEAN											
DIOXIN	STD											
2378-	N											
TETRACHLORO-	MEAN											
DIBENZOFURAN	STD											
23478-	N											
PENTACHLORO-	MEAN											
DIBENZOFURAN	STD											
123478-/	N											
123467-	MEAN											
HEXAChLORO-	STD											
DIBENZOFURAN												
123678-	N											
HEXAChLORO-	MEAN											
DIBENZOFURAN	STD											
HEPTACHLOR	N											
EPOXIDE	MEAN											
	STD											
ALPHA-	N											
HEXAChLORO-	MEAN											
CYCLOHEXANE	STD											
BETA-	N											
HEXAChLORO-	MEAN											
CYCLOHEXANE	STD											

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.
LAKE SUPERIOR, AGAWA ROCK

HERRING GULL		YEAR										
		78	79	80	81	82	83	84	85	86	87	88
GAMMA-	N											
HEXAChLORO-	MEAN											
CYCLOHEXANE	STD											
TOTAL MERCURY	N											
	MEAN											
	STD											
MIREX	N	10	10	10	10	10	12	10	10	10	1	1
	MEAN	0.274	0.328	0.173	0.197	0.512	0.194	0.12	0.12	0.12	0.16	0.0861
	STD	.2639	.4421	.1055	.3486	.5173	.0514	.2759	.1277			
PHOTOMIREX	N	10	10	10	10	10	12	10	10	10	1	1
	MEAN	1.015	0.137	0.137	0.137	0.137	0.137	0.137	0.137	0.137	0.137	0.137
	STD	.0987	.1824									
CIS-NONACHLOR	N											
	MEAN											
	STD											
TRANS-	N											
NONACHLOR	MEAN											
	STD											
OCTACHLORO-	N											
STYRENE	MEAN											
	STD											
PCB 1260	N	10	10	10	10	10	11	10	10	10	1	1
	MEAN	31.07	50.45	20.05	32.96	26.61	18.45	13.49	13.49	13.49	1	1
	STD	18.83	27.61	9.689	16.19	7.213	17.03	4.419	4.419	4.419	5	5
PCB 1254:1260	N											
(conversion	MEAN											
to total PCB	STD											
congener conc												
see pg. 39)												

*All units measured on wet weight basis. Dioxins and furans measured in ug/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.
LAKE SUPERIOR, LEADMAN ISLANDS

HERRING GULL		YEAR
		83
PERCENT LIPID IN EGG	N MEAN STD	1 8.5
OXY- CHLORDANE	N MEAN STD	1 0.228
HEXA- CHLOROBENZENE	N MEAN STD	1 0.07
DDD	N MEAN STD	1 0.047
DDE	N MEAN STD	1 4
DIELDRIN	N MEAN STD	1 0.46
HEPTACHLOR EPOXIDE	N MEAN STD	1 0.159
MIREX	N MEAN STD	1 0.244
PCB 1254:1260 (conversion to total PCB congener conc see pg. 39)	N MEAN STD	1 20

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.
LAKE SUPERIOR, HURON ISLAND

HERRING GULL	YEAR
PERCENT LIPID IN EGG	7.4
MEAN	1
STD	8.3
OXY-CHLORDANE	0.194
MEAN	1
STD	N
HEXA-CHLOROBENZENE	0.049
MEAN	1
STD	N
DDD	0.022
MEAN	1
STD	N
DDE	3.48
MEAN	1
STD	N
DIELDRIN	0.32
MEAN	1
STD	N
HEPTACHLOR EPoxide	0.155
MEAN	1
STD	N
MIREX	0.146
MEAN	1
STD	N
PCB 1254:1260 (conversion to total PCB congener conc see pg. 39)	15.7
MEAN	1
STD	N

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*
LAKE SUPERIOR, LAKE LINDEN

HERRING GULL		YEAR	
		83	
PERCENT LIPID	N	1	
IN EGG	MEAN	7.2	
	STD		
OXY-	N	1	
CHLORDANE	MEAN	0.228	
	STD		
HEXA-	N	1	
CHLOROBENZENE	MEAN	0.041	
	STD		
DDD	N	1	
	MEAN	0.014	
	STD		
DDE	N	1	
	MEAN	3.78	
	STD		
DIELDRIN	N	1	
	MEAN	0.301	
	STD		
HEPTACHLOR	N	1	
EPOXIDE	MEAN	0.167	
	STD		
MIREX	N	1	
	MEAN	0.093	
	STD		
PCB 1254:1260	N	1	
(conversion	MEAN	15.1	
to total PCB	STD		
congener conc			
see pg. 39)			

*All units measured on wet weight basis.

Dioxins and furans measured in ug/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.
LAKE SUPERIOR, GRANITE ISLAND

		YEAR												
		73	74	76	78	79	80	81	82	84	85	86	87	88
PERCENT LIPID	N IN EGG	2 .9192	9 .8507	9 .9083	10 .4417	10 1.716	10 1.06	10 1.047	10 1.185	10 1.02	10 .5207	10 1.02	10 1.02	10 1.02
MEAN	STD													
ALPHA-CHLORDANE	N MEAN	10 0.02	2 0.07	10 0.169	10 0.121	10 0.221	10 0.156	9 0.053	9 0.053	9 0.018	10 0.03	10 0.008	1 .0107	1 .0138
CHLORDANE	STD													
GAMMA-CHLORDANE	N MEAN	10 0.067	2 0.061	10 0.061	10 0.0498	10 0.0553	10 0.0553	9 0.0079	9 0.0079	9 0.0082	10 0.018	10 0.008	1 .0107	1 .0138
OXY-CHLORDANE	STD													
123-CHLOROBENZENE	N MEAN	10 0.063	10 0.255	10 0.406	10 0.177	10 0.197	10 0.335	10 0.179	10 0.179	10 0.179	10 0.18	10 0.238	1 .1864	1 .2291
CHLOROBENZENE	STD													
124-CHLOROBENZENE	N MEAN	10 0.001	10 0	10 0	10 0	10 0	10 0	10 0	10 0	10 0	10 0	10 0	1 .0176	1 .0169
CHLOROBENZENE	STD													
1234-CHLOROBENZENE	N MEAN	10 .0095	10 .0179	10 .0179	10 .0179	10 .0179	10 .0179	10 .0179	10 .0179	10 .0179	10 .0179	10 .0179	1 .0176	1 .0169
CHLOROBENZENE	STD													
1235-/ 1245-CHLOROBENZENE	N MEAN	10 .0096	10 .0069	10 .0077	10 .0077	10 .0223	10 .0223	10 .0049	10 .0049	10 .0049	10 .005	10 .0043	1 .0063	1 .0248
CHLOROBENZENE	STD													

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*
LAKE SUPERIOR, GRANITE ISLAND

HERRING GULL			YEAR											
	73	74	76	78	79	80	81	82	84	85	86	87	88	
PENTA-CHLOROBENZENE	N MEAN STD													
HEXA-CHLOROBENZENE	N MEAN STD	0.228 .0537	.2196 .1232	0.05 .0684	0.138 .0575	0.145 .0602	0.0768 .0256	0.0913 .0227	0.0738 .015	0.0462 .0149	0.0608 .0199	0.047 .0199	0.038 .0199	0.0459 .0199
DDD	N MEAN STD	2 .0245	9 .4418	10 .0494	10 .067	10 .065	10 .0279	10 .0237	10 .0494	10 .0094	10 .009	10 .0092	1 .0092	1 .0092
DDE	N MEAN STD	2 23.7	19.26 14.13	9 6.08	10 3.93	10 3.646	10 5.231	10 6.749	10 3.403	10 3.403	10 3.295	10 3.295	1 .1	1 .1
DDT	N MEAN STD	2 3.96	9 6.993	10 5.24	10 3.349	10 3.662	10 9.9891	10 9.275	10 4.747	10 9.105	10 1.843	10 1.843	1 .1	1 .1
DIELDRIN	N MEAN STD	2 3.230	9 .8274	10 .0808	10 .012	10 .094	10 .0127	10 .024	10 .0155	10 .026	10 .02	10 .044	1 .044	1 .044
2378-TETRACHLORODIBENZO-P-DIOXIN	N MEAN STD	2 .1414	9 .6133	10 .1695	10 .1772	10 .1731	10 .5345	10 .1155	10 .1933	10 .2306	10 .1445	10 .0954	1 .0954	1 .0954
12378-PENTACHLORODIBENZO-P-DIOXIN	N MEAN STD													
123678-HEXACHLORODIBENZO-P-DIOXIN	N MEAN STD													

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.

LAKE SUPERIOR, GRANITE ISLAND

		YEAR												
		73	74	76	78	79	80	81	82	84	85	86	87	88
1234678-	N													
HEPTACHLORO-	MEAN													
DIBENZO-P-	STD													
DIOXIN														
OCTACHLORO-	N													
DIBENZO-P-	MEAN													
DIOXIN	STD													
2378-	N													
TETRACHLORO-	MEAN													
DIBENZOFURAN	STD													
23478-	N													
PENTACHLORO-	MEAN													
DIBENZOFURAN	STD													
123478- /	N													
123467-	MEAN													
HEXAChLORO-	STD													
DIBENZOFURAN														
123678-	N													
HEXAChLORO-	MEAN													
DIBENZOFURAN	STD													
HEPTACHLOR	N													
EPOXIDE	MEAN													
	STD													
ALPHA-	N													
HEXAChLORO-	MEAN													
CYCLOHEXANE	STD													
BETA-	N													
HEXAChLORO-	MEAN													
CYCLOHEXANE	STD													

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.
LAKE SUPERIOR, GRANITE ISLAND

HERRING GULL										YEAR										
	N	MEAN	STD		N	MEAN	STD		N	MEAN	STD		N	MEAN	STD		N	MEAN	STD	
GAMMA-HEXACHLORO-CYCLOHEXANE																				
TOTAL MERCURY	N	0.42	0.3544	0.3	N	9	10		N	10	10		N	10	10		N	1	1	
	MEAN	.0283	0.12	0.066						0.355	0.405							.0021	.0018	
	STD									.0809	.1141									
MIREX	N	1.347	0.0473	0.386	N	10	10		N	10	10		N	10	10		N	1	1	
	MEAN	.7252	.0694	.4797						0.091	0.091							.0201	.0461	
	STD									.0641	.0641									
PHOTOMIREX	N	0.155	0.155	0.086	N	10	10		N	10	10		N	10	10		N	1	1	
	MEAN	0.19	0.19	0.0611						0.0611	0.0611							.0447	.0512	
CIS-NONACHLOR	N	0.086	0.086	0.026	N	10	10		N	10	10		N	10	10		N	1	1	
	MEAN	0.0981	0.0981	0.011						0.011	0.011							.0084	.0084	
	STD																			
TRANS-NONACHLOR	N	0.086	0.086	0.026	N	10	10		N	10	10		N	10	10		N	1	1	
	MEAN	0.0981	0.0981	0.011						0.011	0.011							.0928	.0928	
	STD																			
OCTACHLORO-STYRENE	N	0.086	0.086	0.026	N	10	10		N	10	10		N	10	10		N	1	1	
	MEAN	0.0981	0.0981	0.011						0.011	0.011							.0084	.0084	
	STD																			
PCB 1260	N	49.1	56.23	14.94	N	9	10		N	10	10		N	10	10		N	1	1	
	MEAN	9.899	13.22	3.548						50.21	24.14							15.32	15.32	
	STD									14.46	7.794							4.342	4.342	
PCB 1254:1260	N	75.43	23.28	45.35	N	9	10		N	10	10		N	10	10		N	1	1	
(conversion to total PCB congener conc see pg. 39)	MEAN	17.78	5.824	10.98						59.05	27.48							39.7	39.7	
	STD									16.92	9.301							5.61	5.61	
																	24.5	24.5		
																	8.708	8.708		

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.

LAKE SUPERIOR, GRAVEL ISLAND

DOUBLE-CRESTED CORMORANT		YEAR
PERCENT LIPID IN EGG	N MEAN STD	1 4.7
ALPHA-CHLORDANE	N MEAN STD	0.1 0.01
GAMMA-CHLORDANE	N MEAN STD	0.1 0.005
OXY-CHLORDANE	N MEAN STD	0.1 0.12
1234-CHLOROBENZENE	N MEAN STD	1 .0005
1235- / 1245-CHLOROBENZENE	N MEAN STD	1 .0005
PENTA-CHLOROBENZENE	N MEAN STD	0.1 0.005
HEXA-CHLOROBENZENE	N MEAN STD	1 0.034
DDD	N MEAN STD	1 0.01

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*
LAKE SUPERIOR, GRAVEL ISLAND

DOUBLE-CRESTED CORMORANT			YEAR
DDE	N MEAN STD	1 2.46	83
DDT	N MEAN STD	1 0.01	
DIELDRIN	N MEAN STD	1 0.4	
HEPTACHLOR EPOXIDE	N MEAN STD	1 0.09	
ALPHA- HEXACHLORO- CYCLOHEXANE	N MEAN STD	1 0.02	
BETA- HEXACHLORO- CYCLOHEXANE	N MEAN STD	1 0.01	
MIREX	N MEAN STD	1 0.03	
TRANS- NONACHLOR	N MEAN STD	1 0.01	
PCB 1260	N MEAN STD	10 10	

*All units measured on wet weight basis.

Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.
LAKE SUPERIOR, GRAVEL ISLAND

DOUBLE-CRESTED CORMORANT	YEAR
	83
PCB 1254; 1260 (N (conversion to total PCB congener conc see pg. 39)	1 12.9

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

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TABLE 11. Contaminant data, summarized by Location.
LAKE SUPERIOR, SILVER ISLET

HERRING GULL		YEAR		
PERCENT LIPID IN EGG		73	75	77
MEAN		7.55	8.16	10
STD		.0707	.9082	9.23
ALPHA-CHLORDANE	N MEAN STD			0.021 .0074
OXY-CHLORDANE	N MEAN STD			10 .2610 .1540
HEXA-CHLOROBENZENE	N MEAN STD	2 0.19 .0269	10 .1216 .0822	10 .1230 .1718
DDD	N MEAN STD	2 0.007	10 .1372 .0506	10 .1417 .0625
DDE	N MEAN STD	2 26.8 6.647	10 24.16 10.85	10 11.82 6.882
DDT	N MEAN STD	2 58.89 .0806	10 .2508 .1231	10 0.057 .0316
DIELDRIN	N MEAN STD	2 0.435 .1485	10 0.44 .3355	10 0.353 .1636
HEPTACHLOR EPOXIDE	N MEAN STD	2 0.08 .0283	10 0.19 .0806	10 0.109 .0475

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*

LAKE SUPERIOR, SILVER ISLET

HERRING GULL			YEAR		
	N		73	75	77
BETA-HEXACHLORO-CYCLOHEXANE	MEAN			0.10	0.026
	STD				.0246
TOTAL MERCURY	N		2	10	
	MEAN		0.53	0.417	
	STD		.0424	.1193	
MIREX	N		10		
	MEAN		0.619	0.237	
	STD		.3686	.2253	
PHOTOMIREX	N			10	
	MEAN			0.115	
	STD			0.103	
PCB 1260	N		2	10	10
	MEAN		52.35	63.52	44.35
	STD		16.62	26.27	18.81
PCB 1254:1260 (conversion to total PCB congener conc see pg. 39)	N				
	MEAN		10	10	
	STD		82.02	54.91	
	concn		33.34	22.2	

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*
LAKE SUPERIOR, PAPOOSE ISLAND

HERRING GULL	YEAR
PERCENT LIPID N IN EGG	83
MEAN	1
STD	7.8
OXY- CHLORDANE	N MEAN STD
HEXA- CHLOROBENZENE	N MEAN STD
DDD	N MEAN STD
DDE	N MEAN STD
DIELDRIN	N MEAN STD
HEPTACHLOR EPOXIDE	N MEAN STD
MIREX	N MEAN STD
PCB 1254:1260 (conversion to total PCB congener conc see pg. 39)	N MEAN STD

*All units measured on wet weight basis.

Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.
LAKE SUPERIOR, GULL ISLAND

HERRING GULL		YEAR	
PERCENT LIPID IN EGG	N	83	86
	MEAN	8.85	1
	STD	.6364	6.7
ALPHA-CHLORDANE	N	0.01	1
	MEAN		
	STD		
GAMMA-CHLORDANE	N	0.005	1
	MEAN		
	STD		
OXY-CHLORDANE	N	.4005	2
	MEAN		
	STD		
1234-CHLOROBENZENE	N	0.024	1
	MEAN		
	STD		
1235-/1245-CHLOROBENZENE	N	0.006	1
	MEAN		
	STD		
PENTA-CHLOROBENZENE	N	0.014	1
	MEAN		
	STD		
HEXA-CHLOROBENZENE	N	.0765	2
	MEAN		
	STD		
DDD	N	.0225	2
	MEAN		
	STD		

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.
LAKE SUPERIOR, GULL ISLAND

HERRING GULL		YEAR	
	N	83	86
DDE	MEAN	4.57 ²	
	STD	.1131	
DDT	MEAN	0.1	
	STD	0.02	
DIELDRIN	MEAN	5455 ²	
	STD	.1054	
2378-	N	1	
TETRACHLORO-	MEAN	16	
DIBENZO-P-	STD		
DIOXIN			
12378-	N	1	
PENTACHLORO-	MEAN	11	
DIBENZO-P-	STD		
DIOXIN			
123678-	N	1	
HEXAChLORO-	MEAN	14	
DIBENZO-P-	STD		
DIOXIN			
1234678-	N	1	
HEPTACHLORO-	MEAN	6	
DIBENZO-P-	STD		
DIOXIN			
OCTACHLORO-	N	1	
DIBENZO-P-	MEAN	10	
DIOXIN	STD		
2378-	N	1	
TETRACHLORO-	MEAN	2	
DIBENZOFURAN	STD		

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.
LAKE SUPERIOR, GULL ISLAND

HERRING GULL		YEAR
23478-	N MEAN STD	83 86 1 8
PENTACHLORO- DIBENZOFURAN		
123478-/	N MEAN STD	1 4
123467- HEXACHLORO- DIBENZOFURAN		
123678- HEXACHLORO- DIBENZOFURAN	N MEAN STD	1 4
HEPTACHLOR EPOXIDE	N MEAN STD	0.261 .0127
ALPHA- HEXACHLORO- CYCLOHEXANE	N MEAN STD	0.01 1
BETA- HEXACHLORO- CYCLOHEXANE	N MEAN STD	0.01 1
MIREX	N MEAN STD	2 0.108 .0028
TRANS- NONACHLOR	N MEAN STD	0.02 1
PCB 1260	N MEAN STD	29.4 1

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.

TABLE 11. Contaminant data, summarized by Location.*
LAKE SUPERIOR, GULL ISLAND

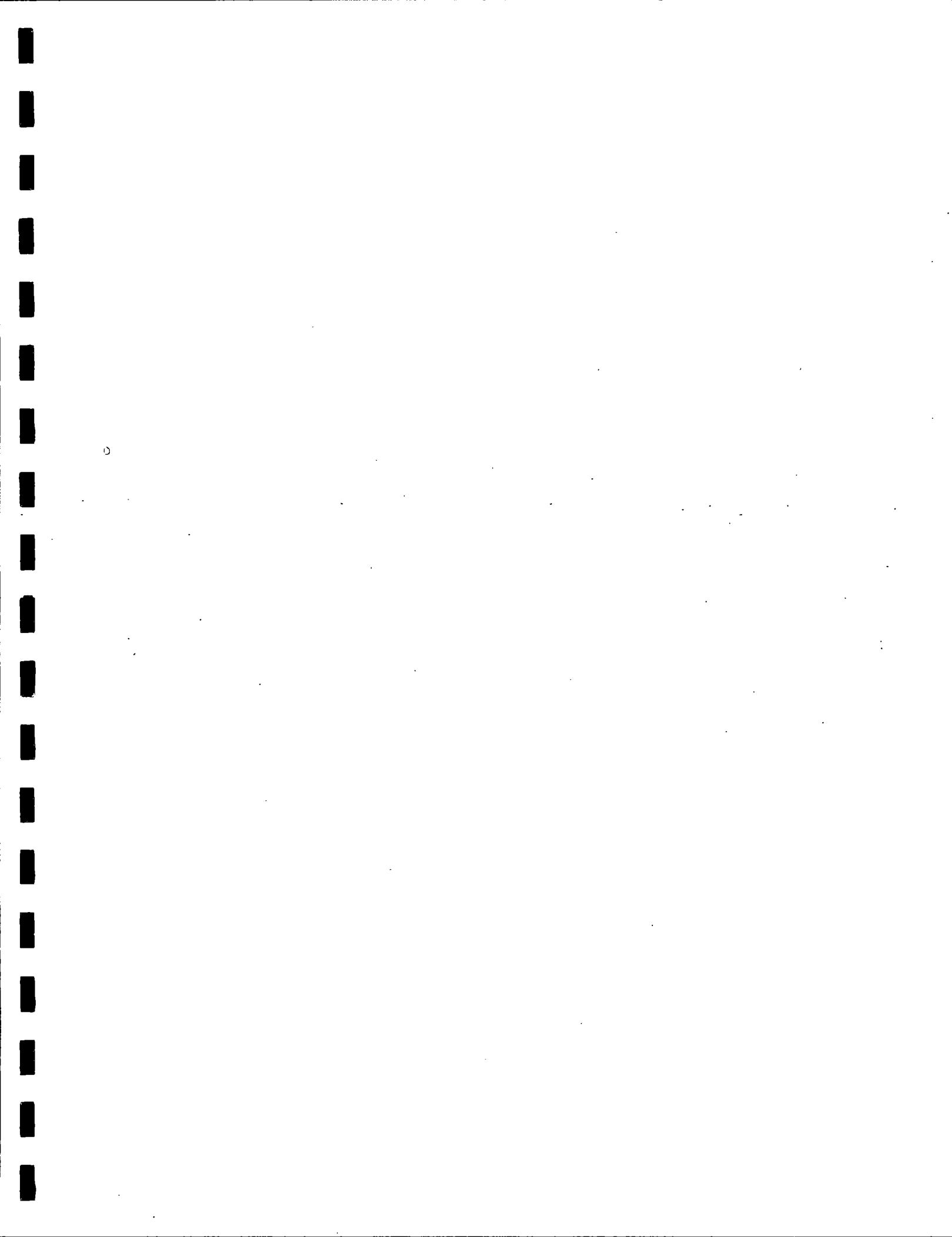
HERRING GULL	YEAR	
	83	86
PCB 1254:1260	N	
(conversion	MEAN	2
to total PCB	STD	32.65
congener conc		6.01
see pg. 39)		

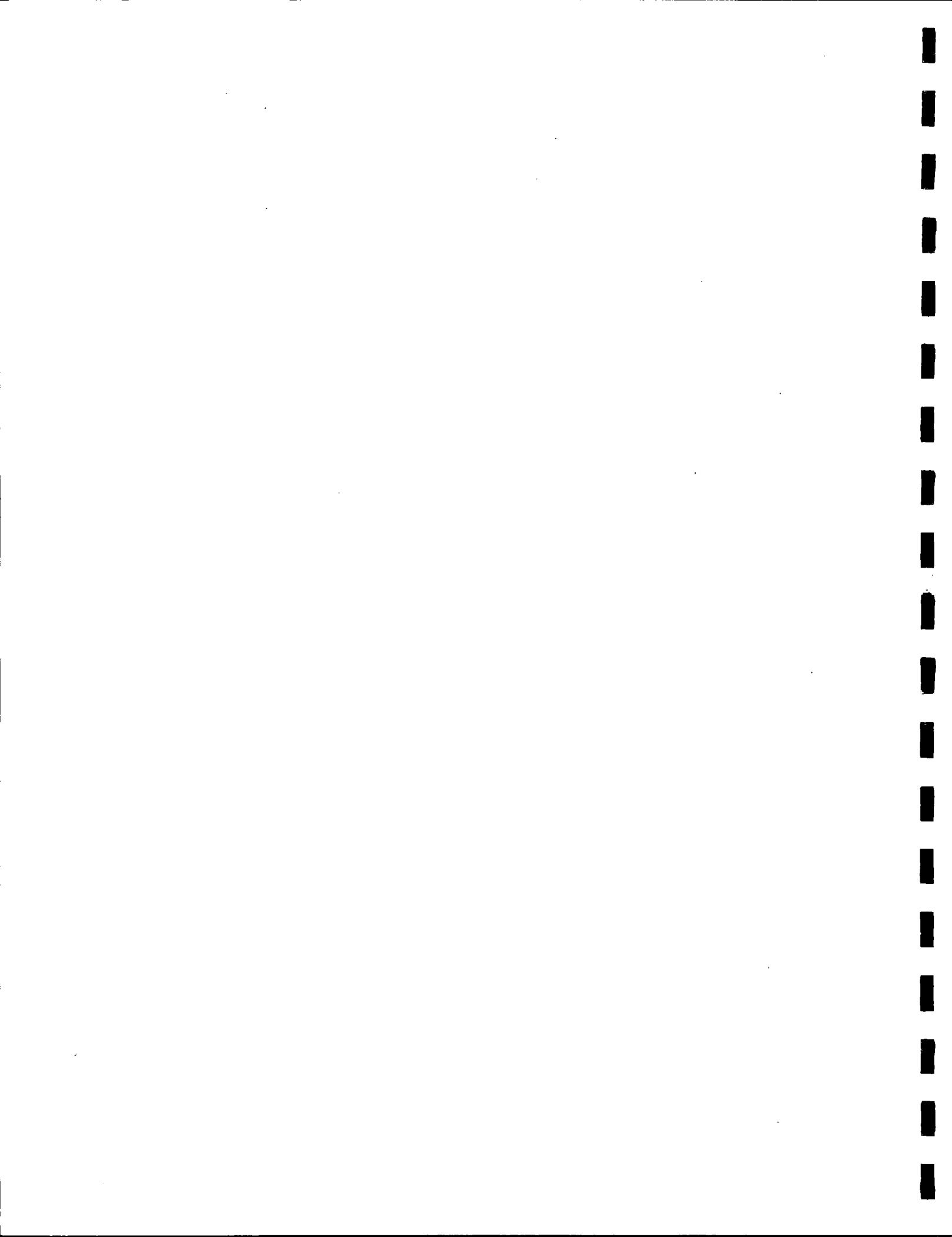
*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g. 1-217

TABLE 11. Contaminant data, summarized by Location.
LAKE SUPERIOR, KNIFE ISLAND

HERRING GULL	YEAR
PERCENT LIPID IN EGG	1 8.3
MEAN	1 8.3
STD	
OXY-CHLORDANE	N 0.288
MEAN	1 0.288
STD	
HEXA-CHLOROBENZENE	N 0.052
MEAN	1 0.052
STD	
DDD	N 0.018
MEAN	1 0.018
STD	
DDE	N 3.84
MEAN	1 3.84
STD	
DIELDRIN	N 0.224
MEAN	1 0.224
STD	
HEPTACHLOR EPONIDE	N 0.173
MEAN	1 0.173
STD	
MIREX	N 0.032
MEAN	1 0.032
STD	
PCB 1254:1260 (conversion to total PCB congener conc see pg. 39)	N 16.7
MEAN	1 16.7
STD	

*All units measured on wet weight basis. Dioxins and furans measured in pg/g; all others measured in ug/g.





Section 2.

**Index to Trends in Contaminants In Herring Gull eggs
from Great Lakes Annual Monitor Colonies**

**Figures 11-24. Trends in Contaminants in Herring Gull eggs from
Great Lakes Annual Monitor Colonies**

Index to trends in Contaminants in Herring Gull eggs from Great Lakes annual monitor colonies.

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*The combined results during 1970-1988 from these colonies represent the trends in contaminant concentrations in Herring Gull eggs from that general site on each particular Lake.

Figure 11. Trends in mean concentrations of p,p'-DDE, dieldrin, PCB 1254:1260 and 2,3,7,8-TCDD in Herring Gull eggs from Snake Island and West Brothers Island, Lake Ontario (1973-1988).

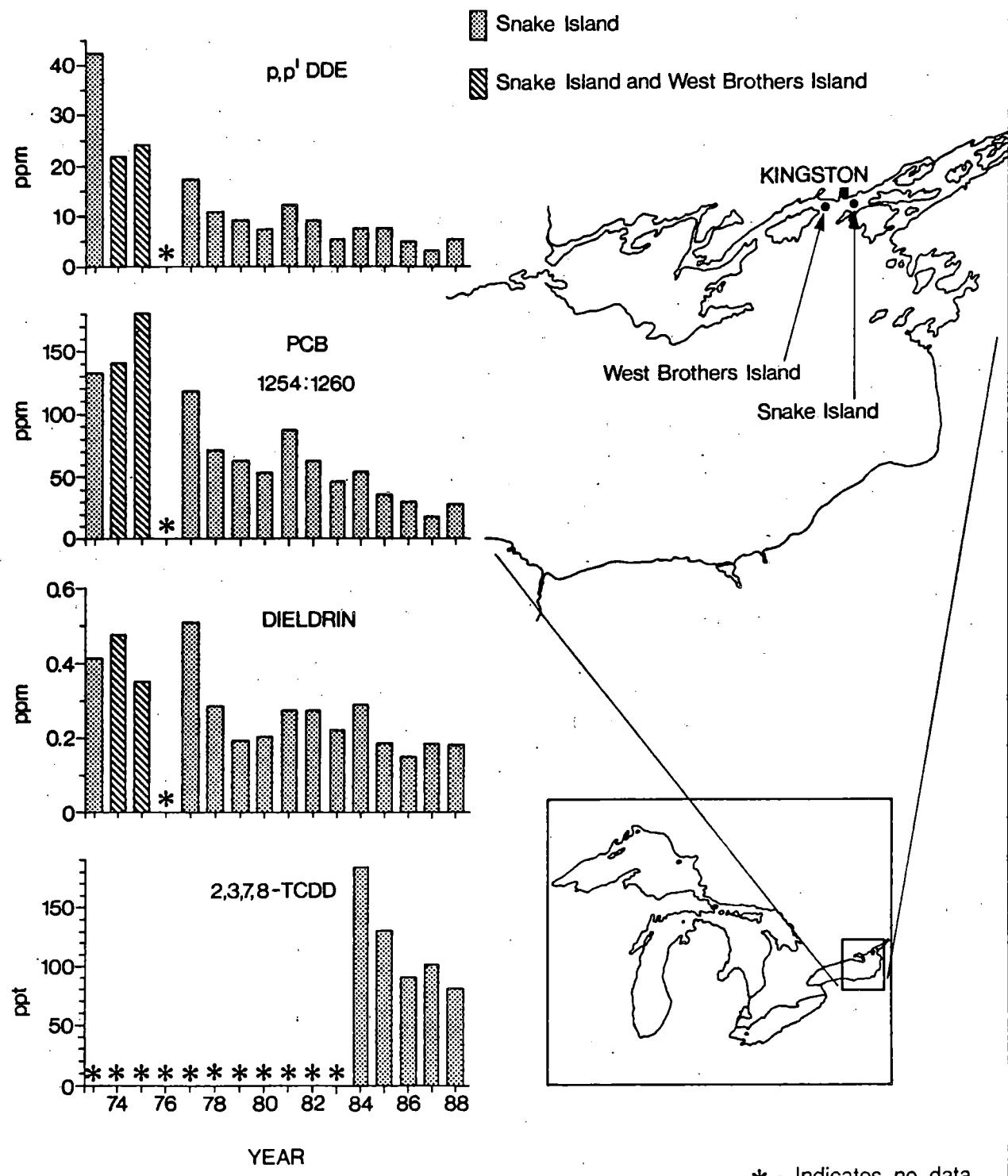
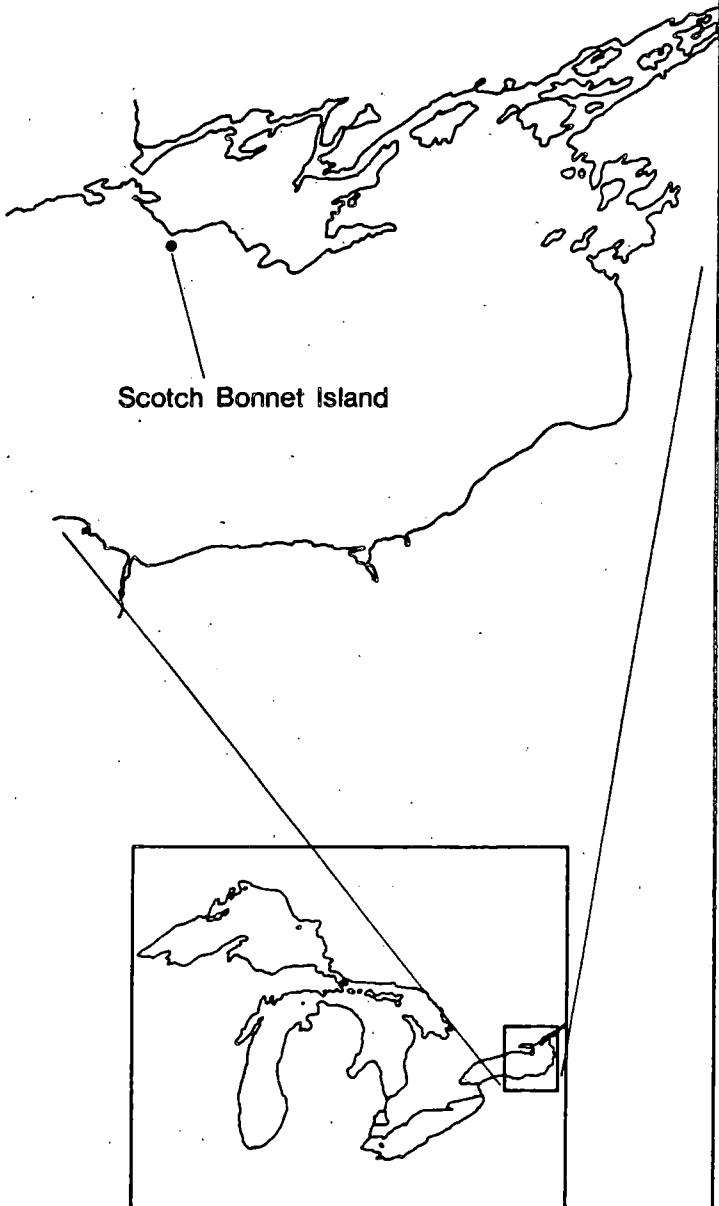
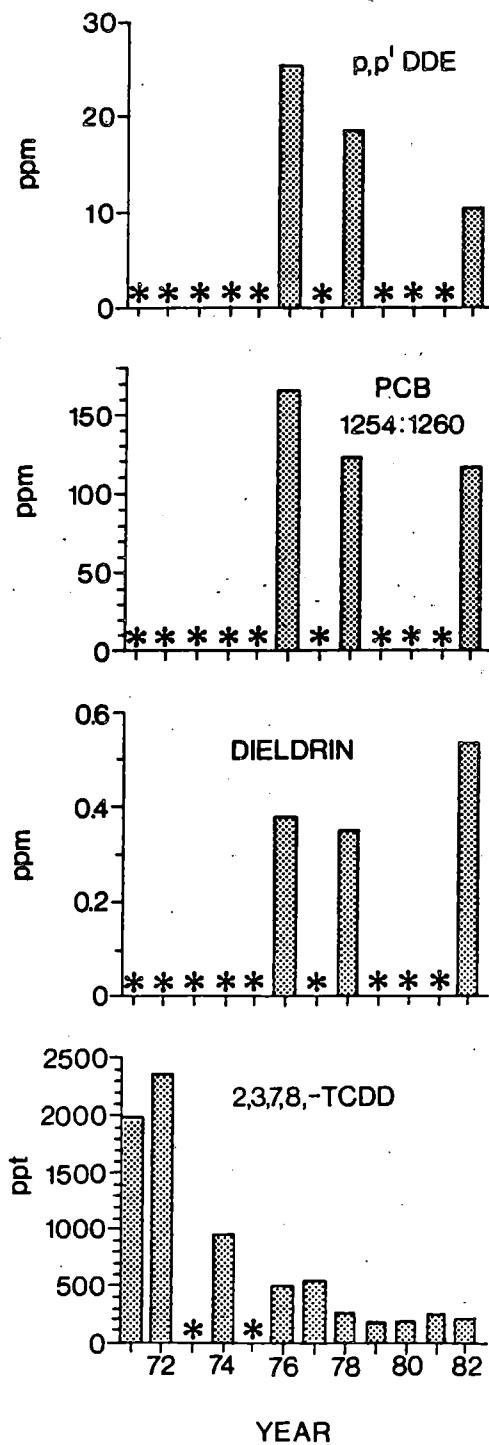


Figure 12. Trends in mean concentrations of p,p'-DDE, dieldrin, PCB 1254:1260 and 2,3,7,8-TCDD in Herring Gull eggs from Scotch Bonnet Island, Lake Ontario (1971-1982)



* - Indicates no data

Figure 13. Trends in mean concentrations of p,p'-DDE, dieldrin, PCB 1254:1260 and 2,3,7,8-TCDD in Herring Gull eggs from Mugg's Island and Leslie St. Spit, Lake Ontario (1974-1988).

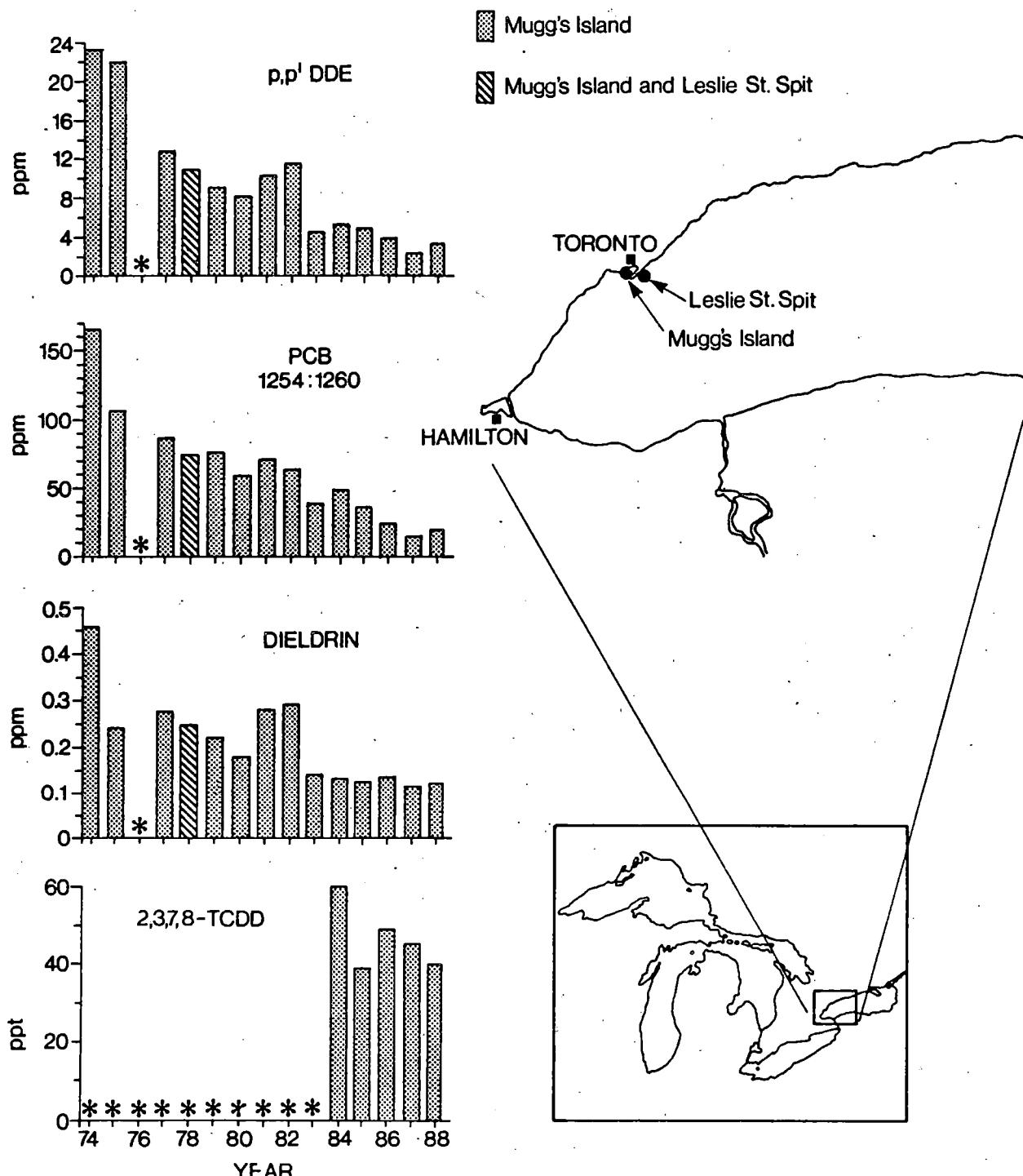
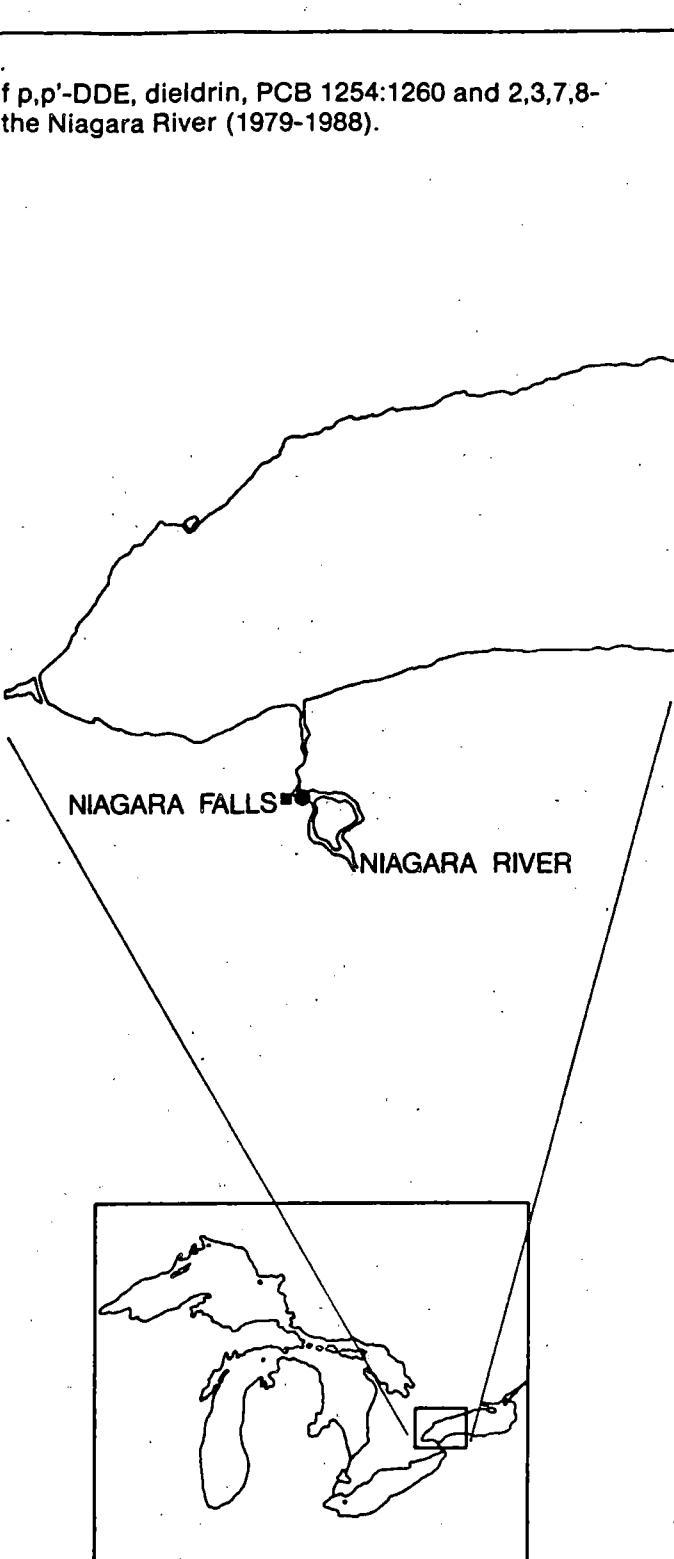
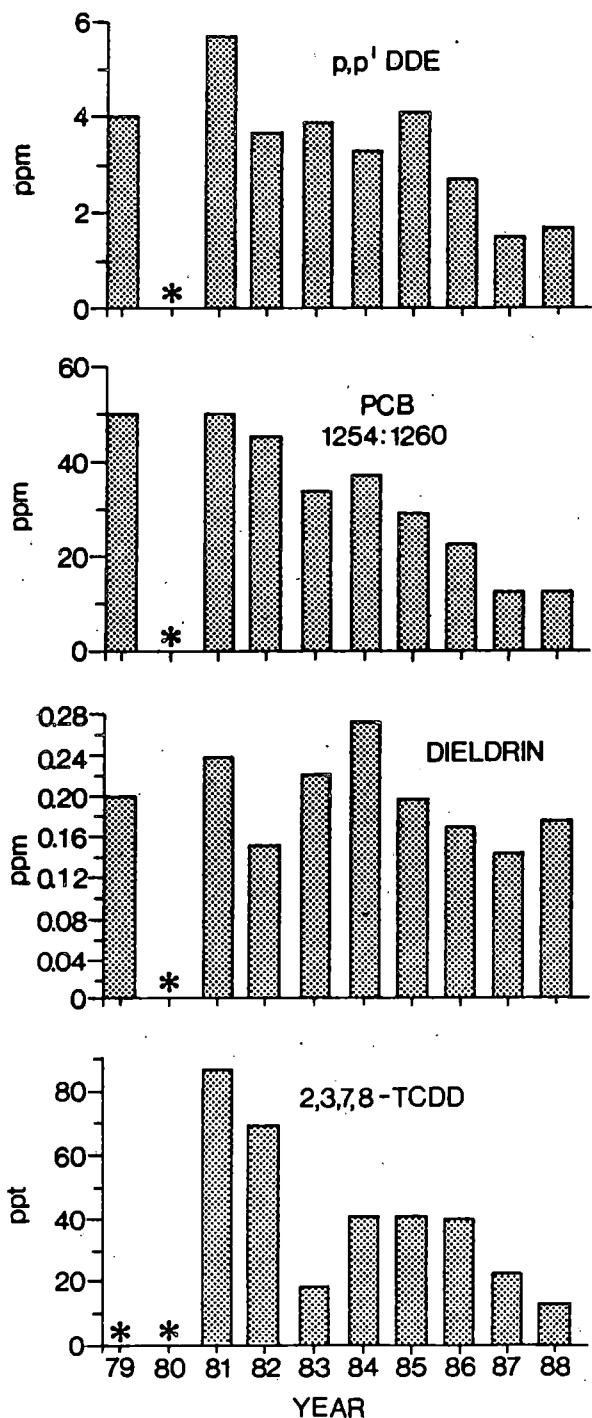
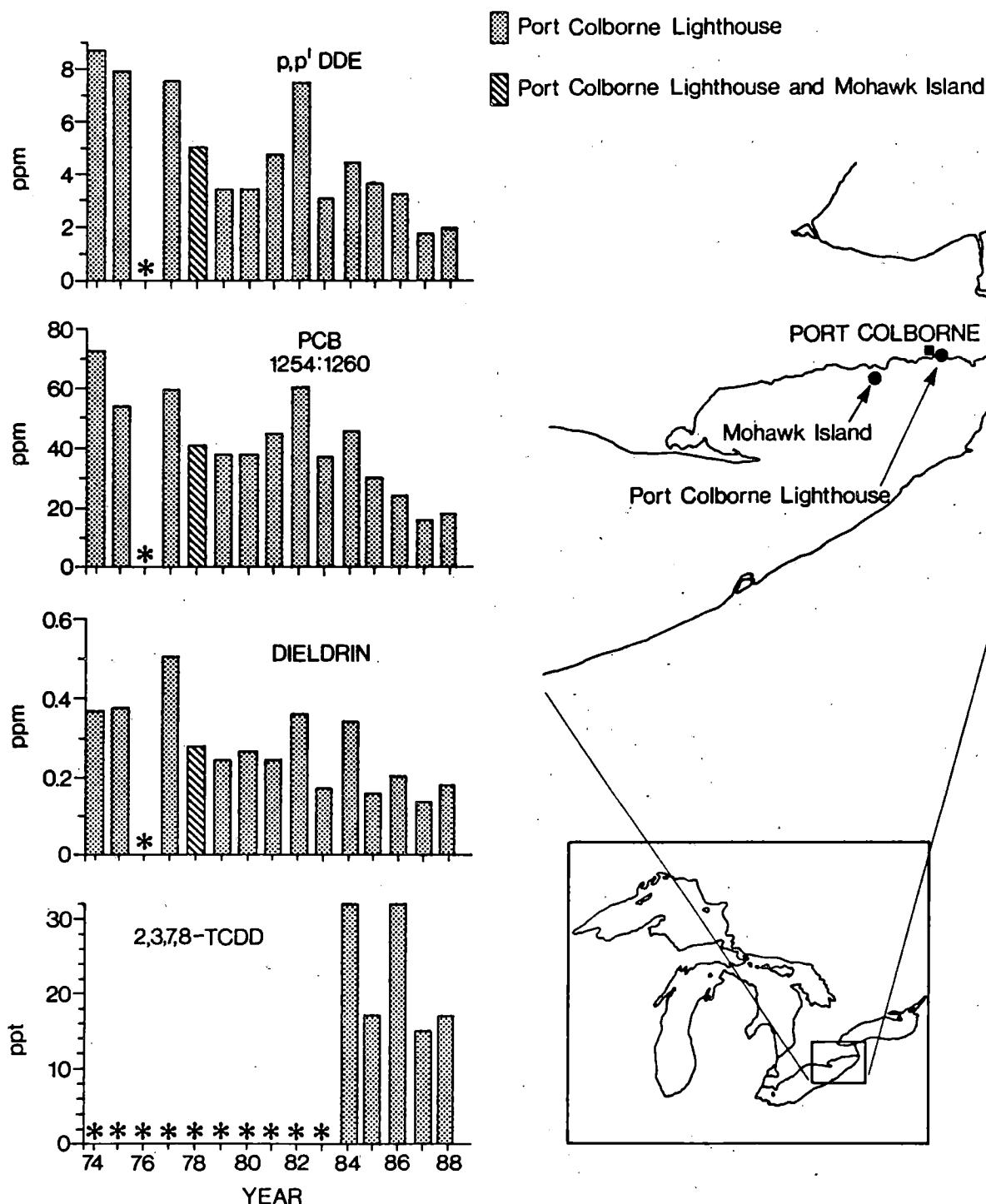


Figure 14. Trends in mean concentrations of p,p'-DDE, dieldrin, PCB 1254:1260 and 2,3,7,8-TCDD in Herring Gull eggs from the Niagara River (1979-1988).



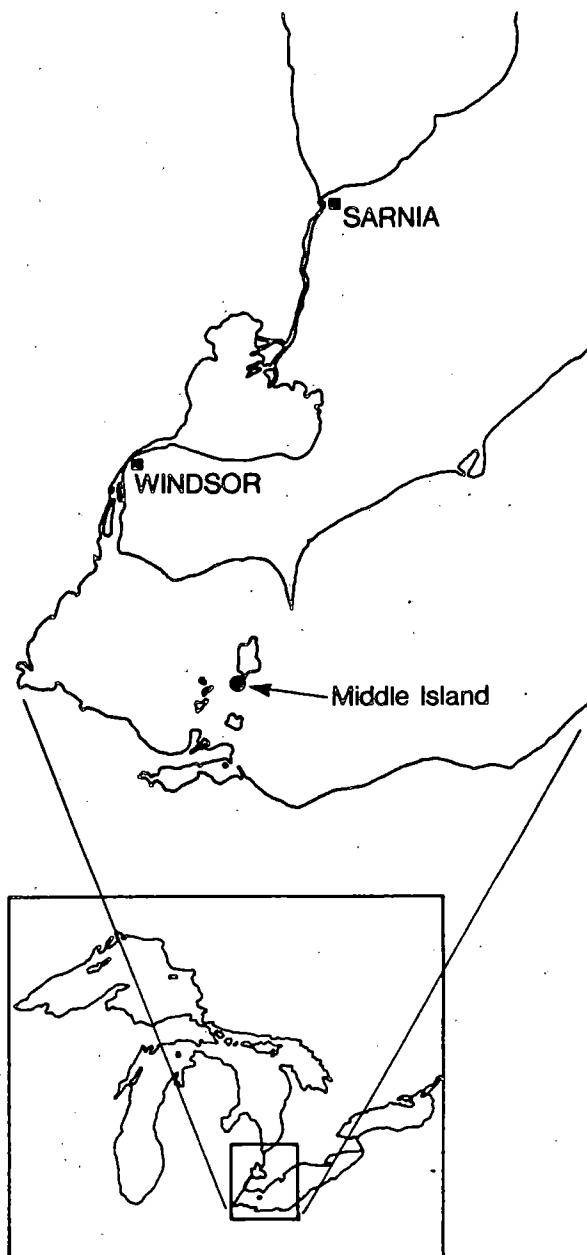
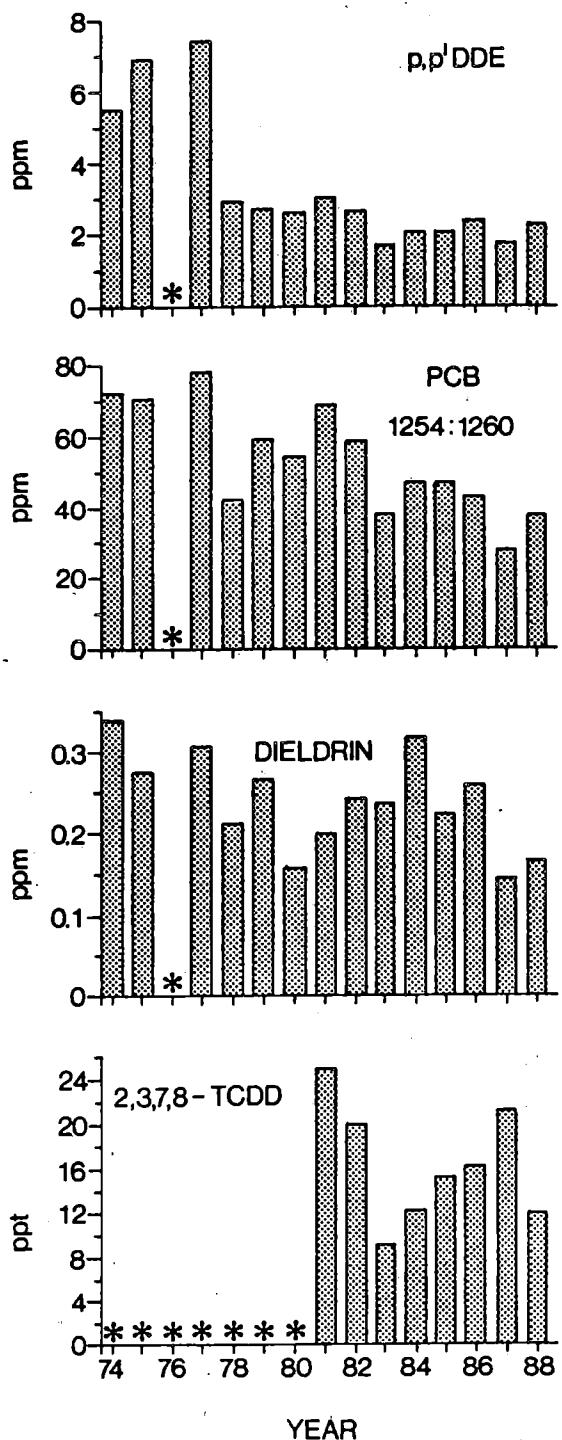
* - Indicates no data

Figure 15. Trends in mean concentrations of p,p'-DDE, dieldrin, PCB 1254:1260 and 2,3,7,8-TCDD in Herring Gull eggs from Port Colborne Lighthouse and Mohawk Island, Lake Erie (1974-1988).



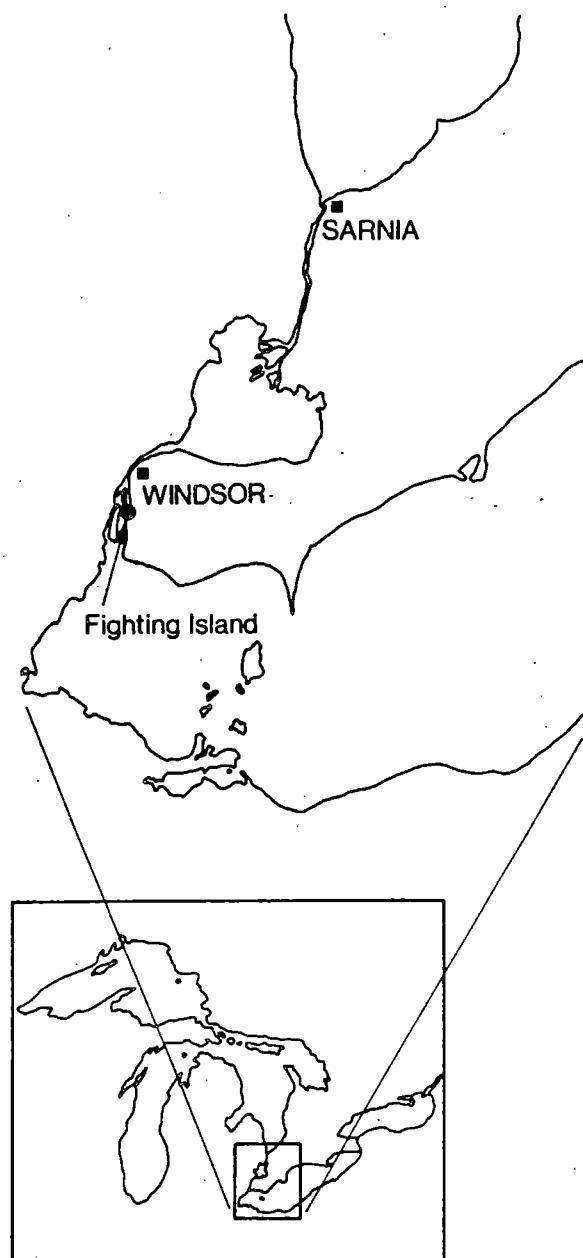
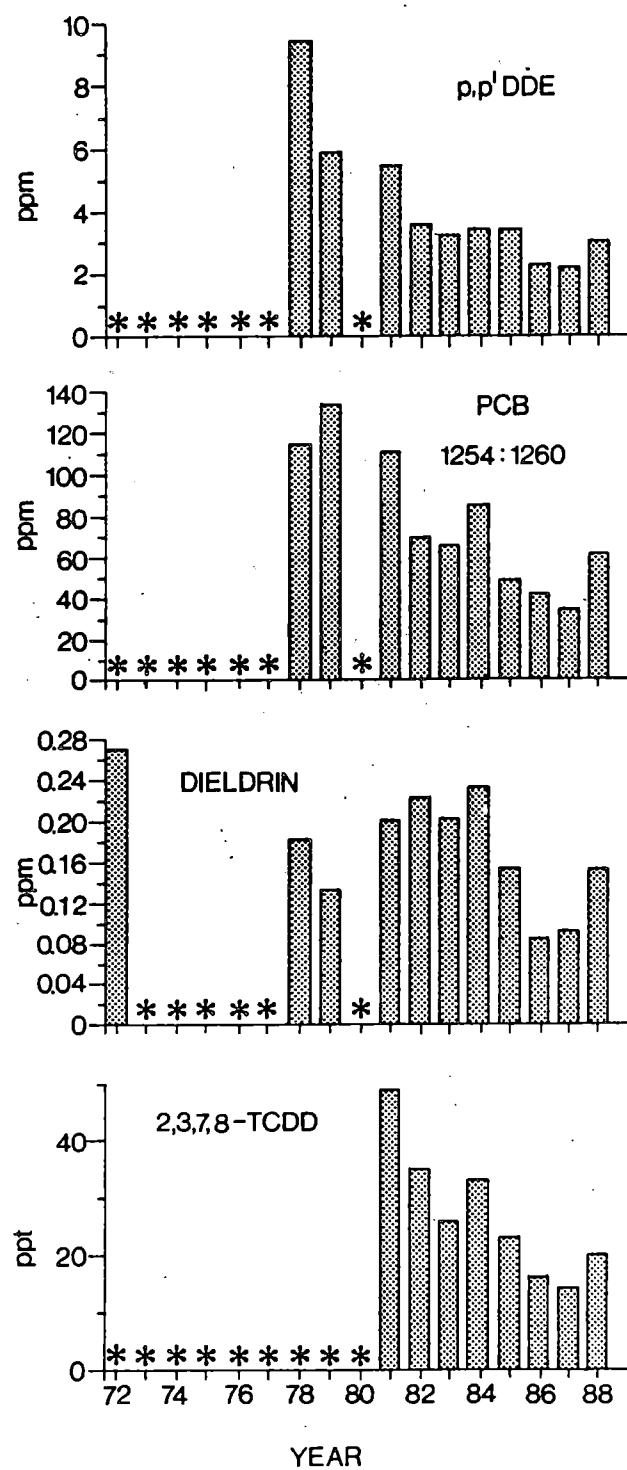
* - Indicates no data

Figure 16. Trends in mean concentrations of p,p'-DDE, dieldrin, PCB 1254:1260 and 2,3,7,8-TCDD in Herring Gull eggs from Middle Island, Lake Erie (1974-1988).



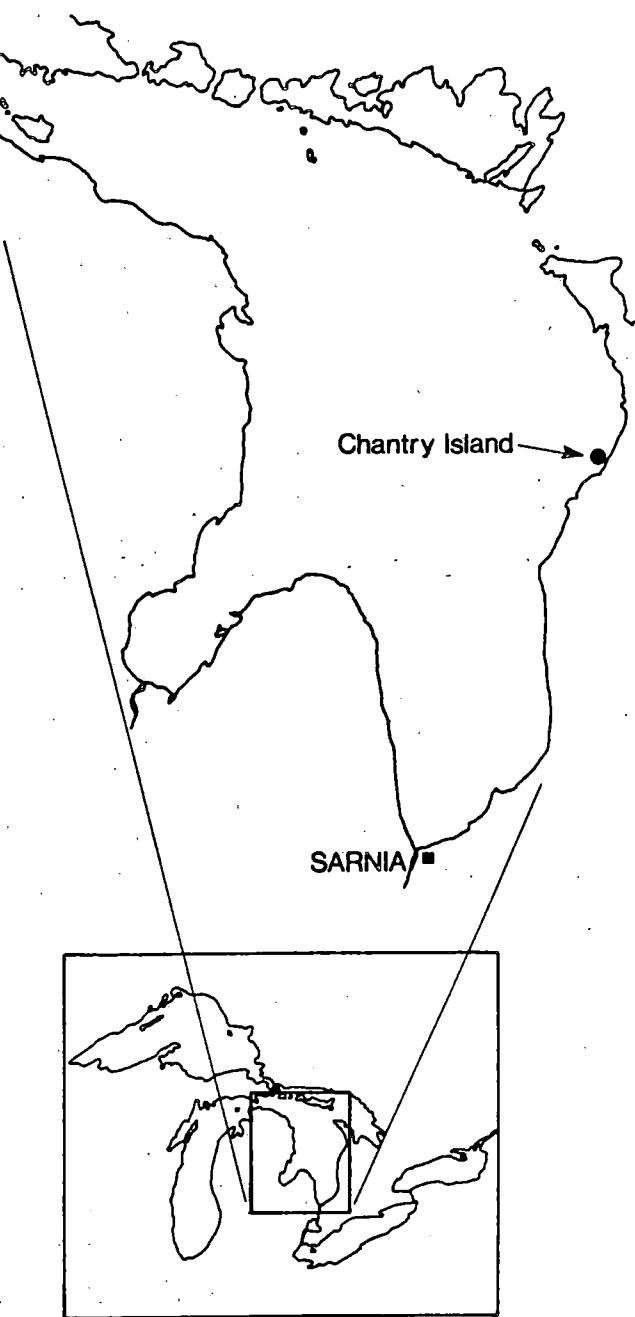
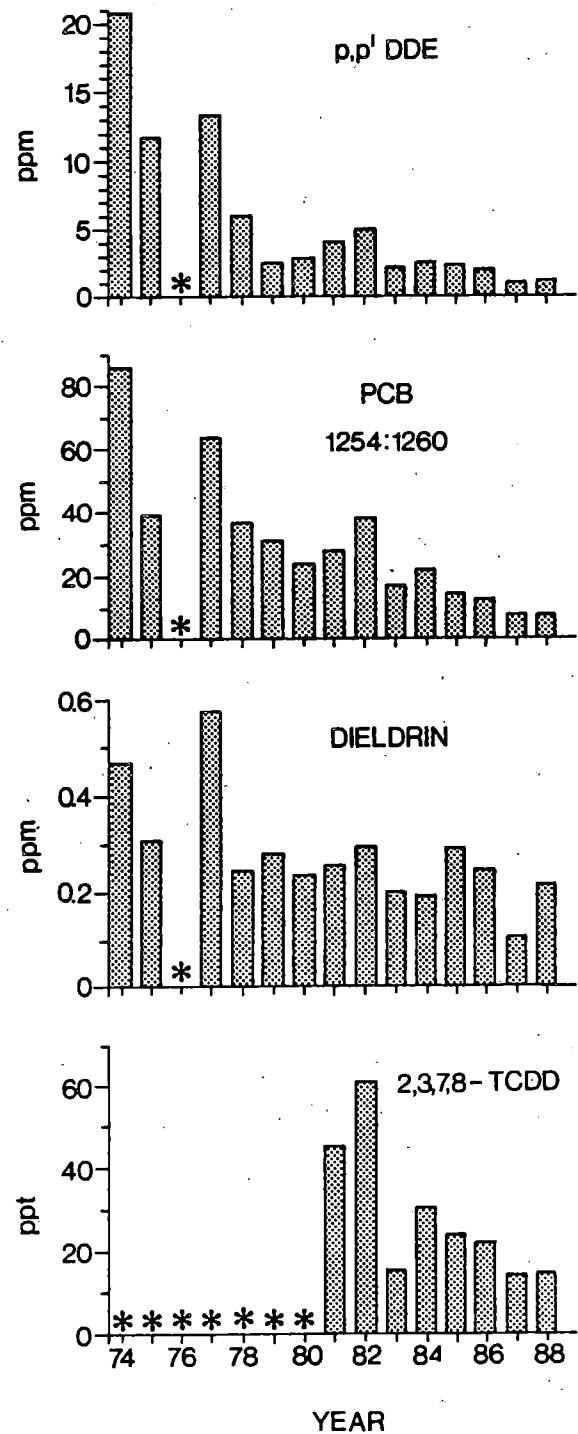
* - Indicates no data

Figure 17. Trends in mean concentrations of p,p'-DDE, dieldrin, PCB 1254:1260 and 2,3,7,8-TCDD in Herring Gull eggs from Fighting Island, Detroit River (1972-1988).



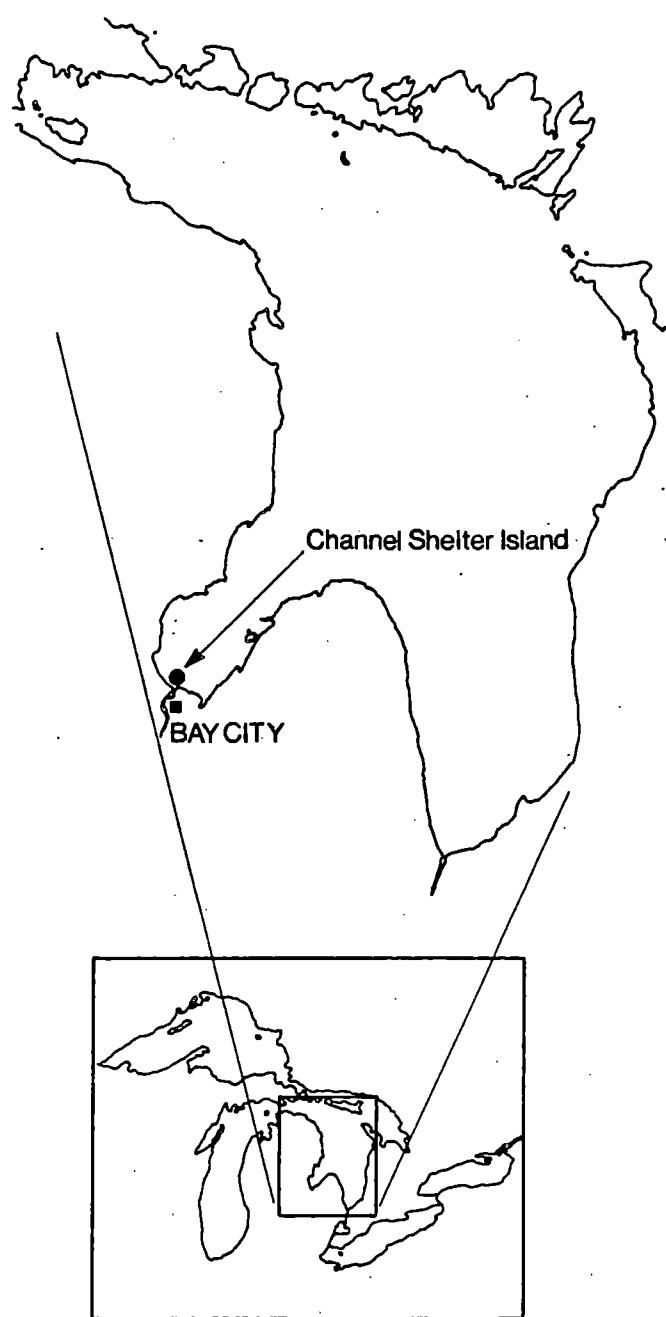
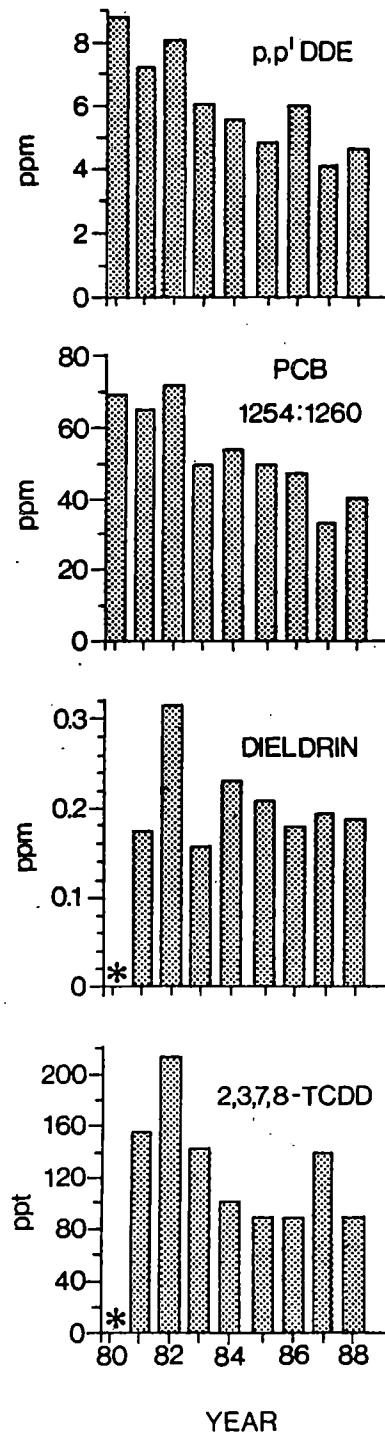
* - Indicates no data

Figure 18. Trends in mean concentrations of p,p'-DDE, dieldrin, PCB 1254:1260 and 2,3,7,8-TCDD in Herring Gull eggs from Chantry Island, Lake Huron (1974-1988).



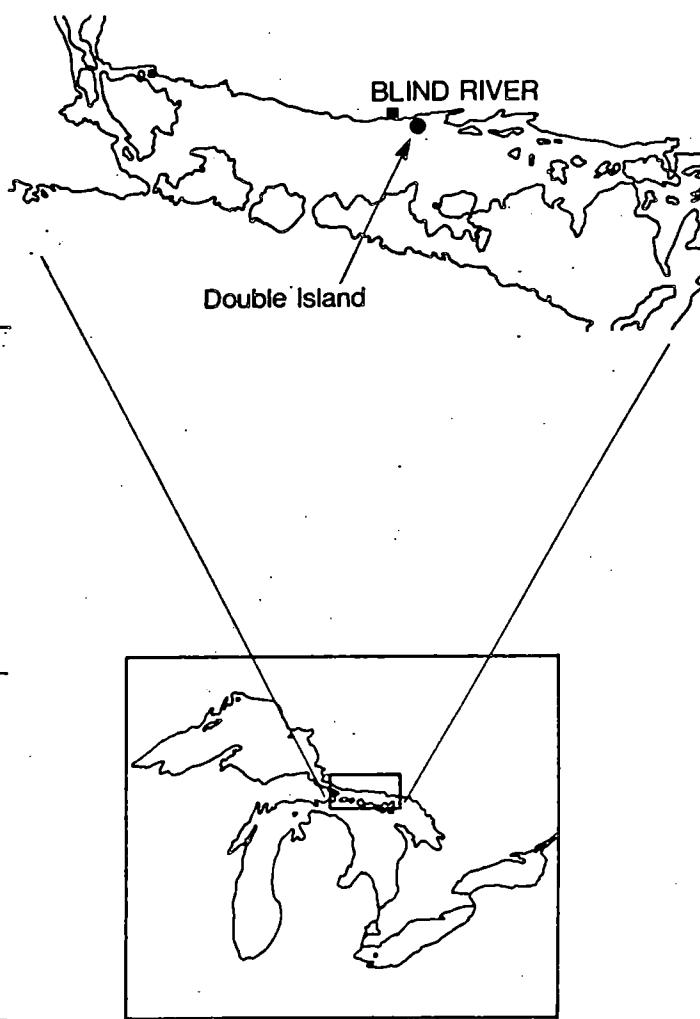
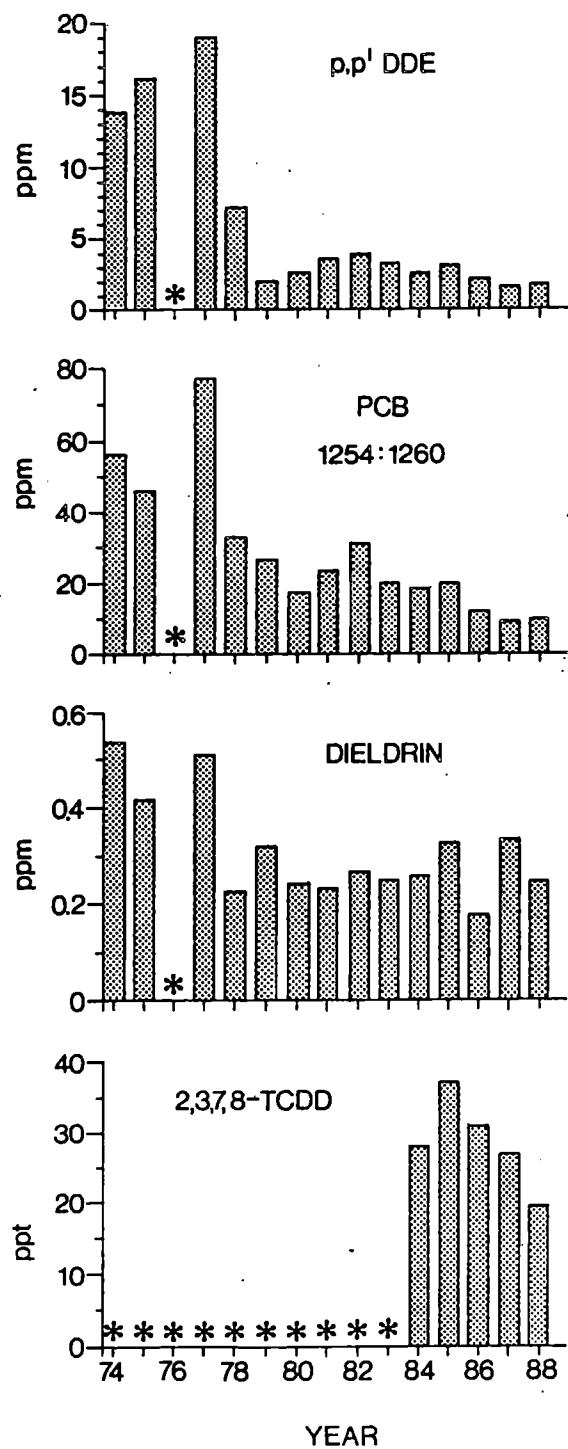
* - Indicates no data

Figure 19. Trends in mean concentrations of p,p'-DDE, dieldrin, PCB 1254:1260 and 2,3,7,8-TCDD in Herring Gull eggs from Channel Shelter Island, Lake Huron (1980-1988).



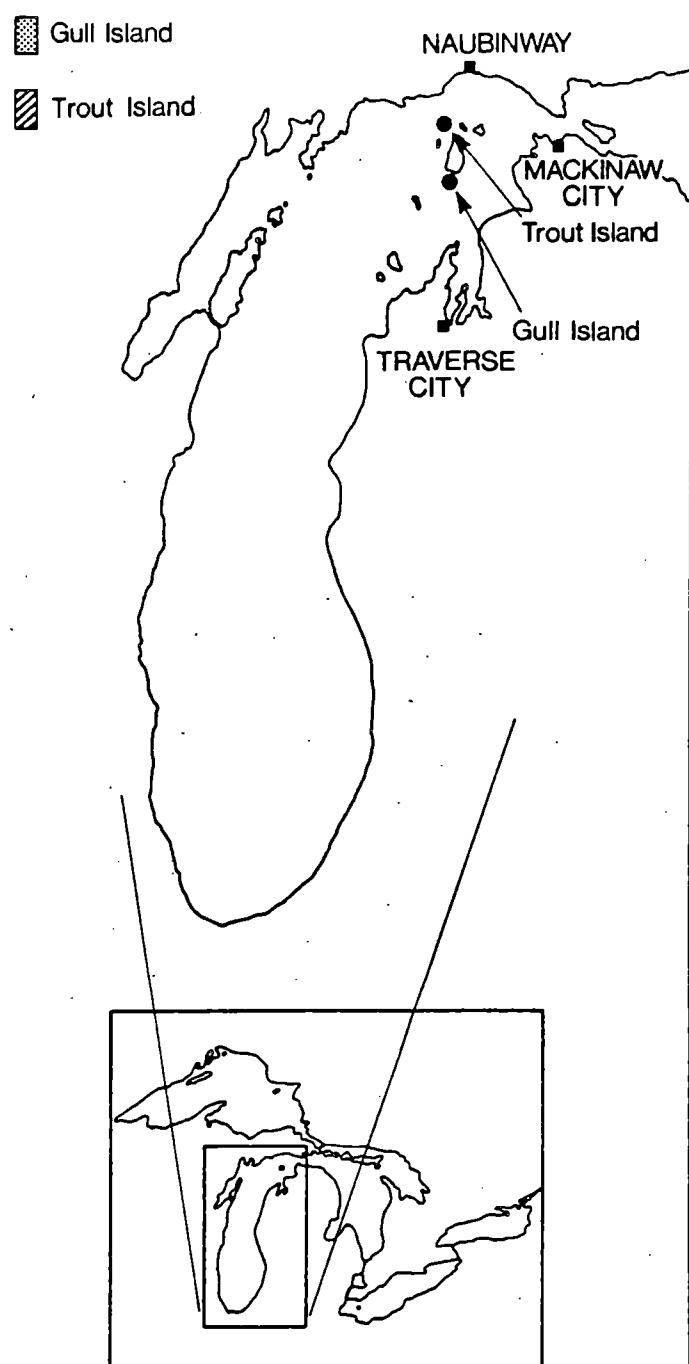
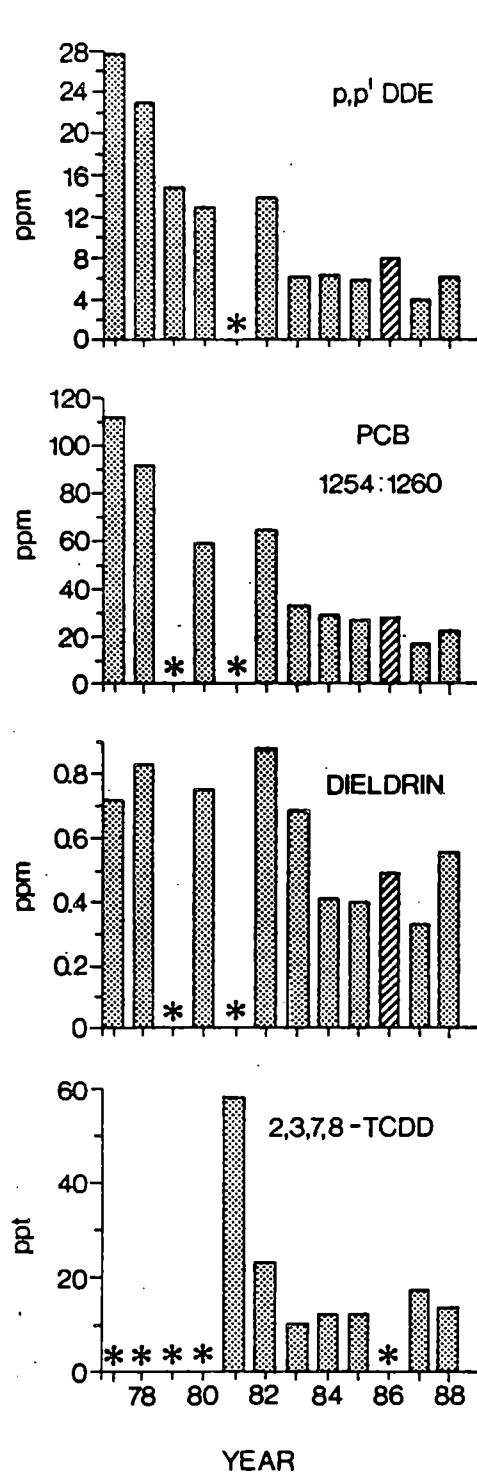
* - Indicates no data

Figure 20. Trends in mean concentrations of p,p'-DDE, dieldrin, PCB 1254:1260 and 2,3,7,8-TCDD in Herring Gull eggs from Double Island, North Channel, Lake Huron (1974-1988).



* - Indicates no data

Figure 21. Trends in mean concentrations of p,p'-DDE, dieldrin, PCB 1254:1260 and 2,3,7,8-TCDD in Herring Gull eggs from Gull Island and Trout Island, Lake Michigan (1977-1988).



* - Indicates no data

Figure 22. Trends in mean concentrations of p,p'-DDE, dieldrin, PCB 1254:1260 and 2,3,7,8-TCDD in Herring Gull eggs from Big Sister Island, Hat Island and Little Sister Island, Lake Michigan (1971-1988).

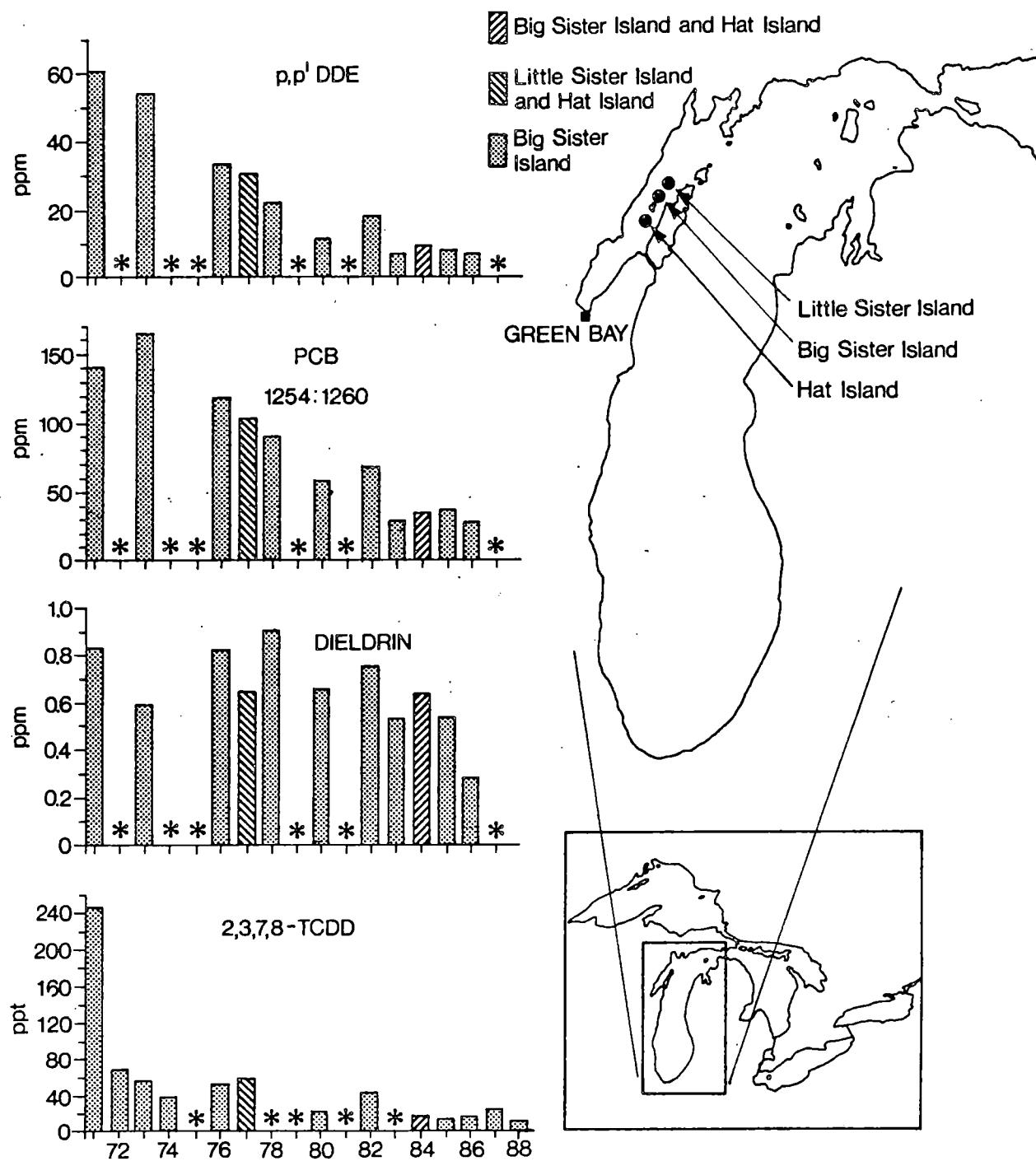
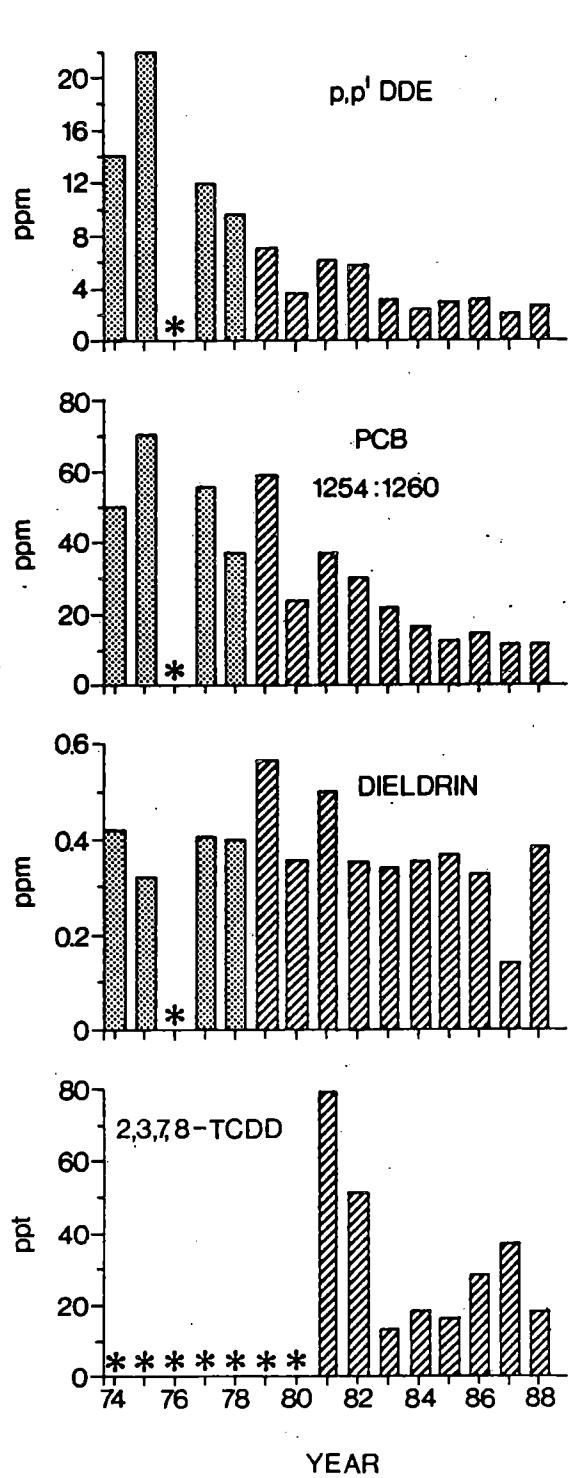
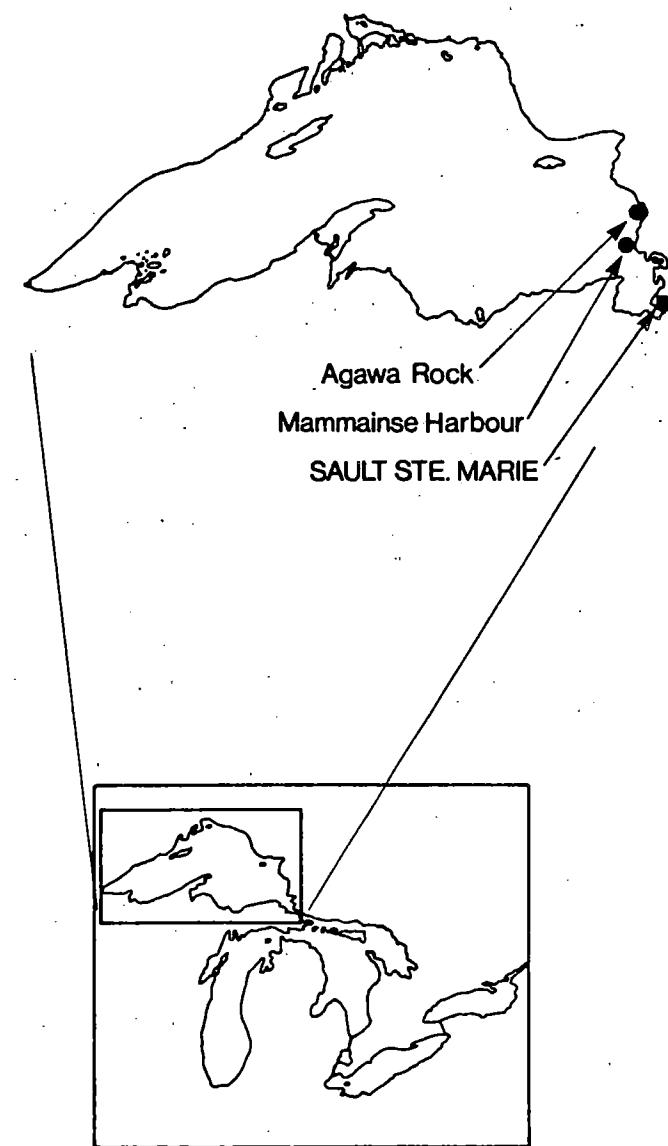


Figure 23. Trends in mean concentrations of p,p'-DDE, dieldrin, PCB 1254:1260 and 2,3,7,8-TCDD in Herring Gull eggs from Agawa Rock and Mammaintse Harbour, Lake Superior (1974-1988).



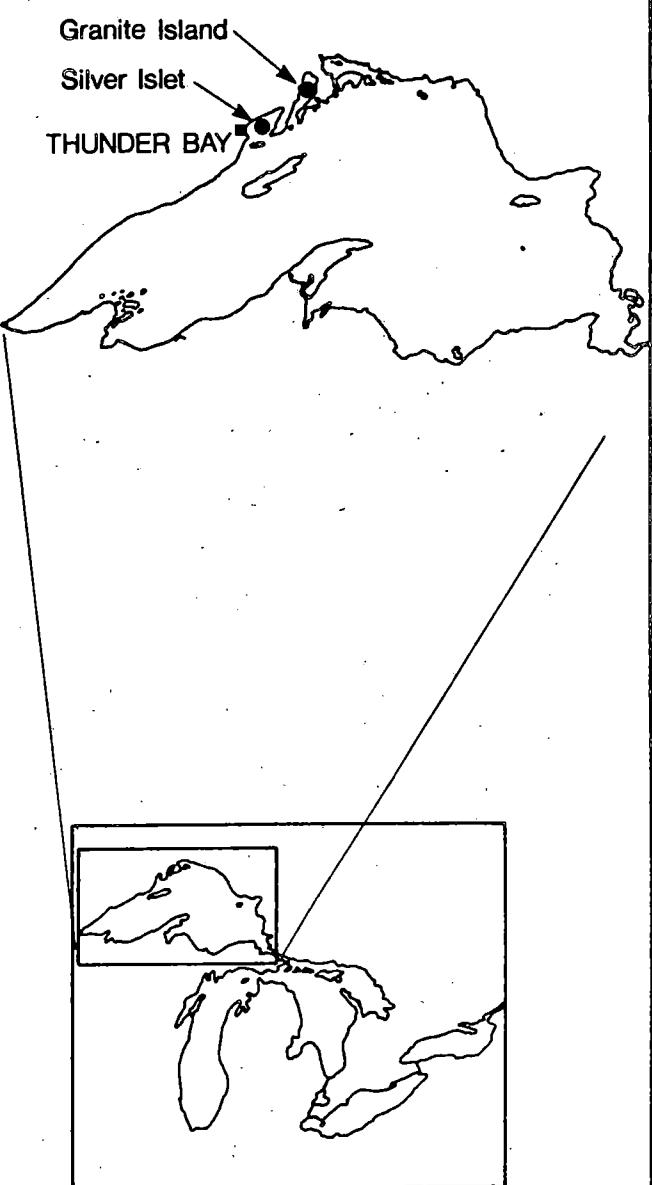
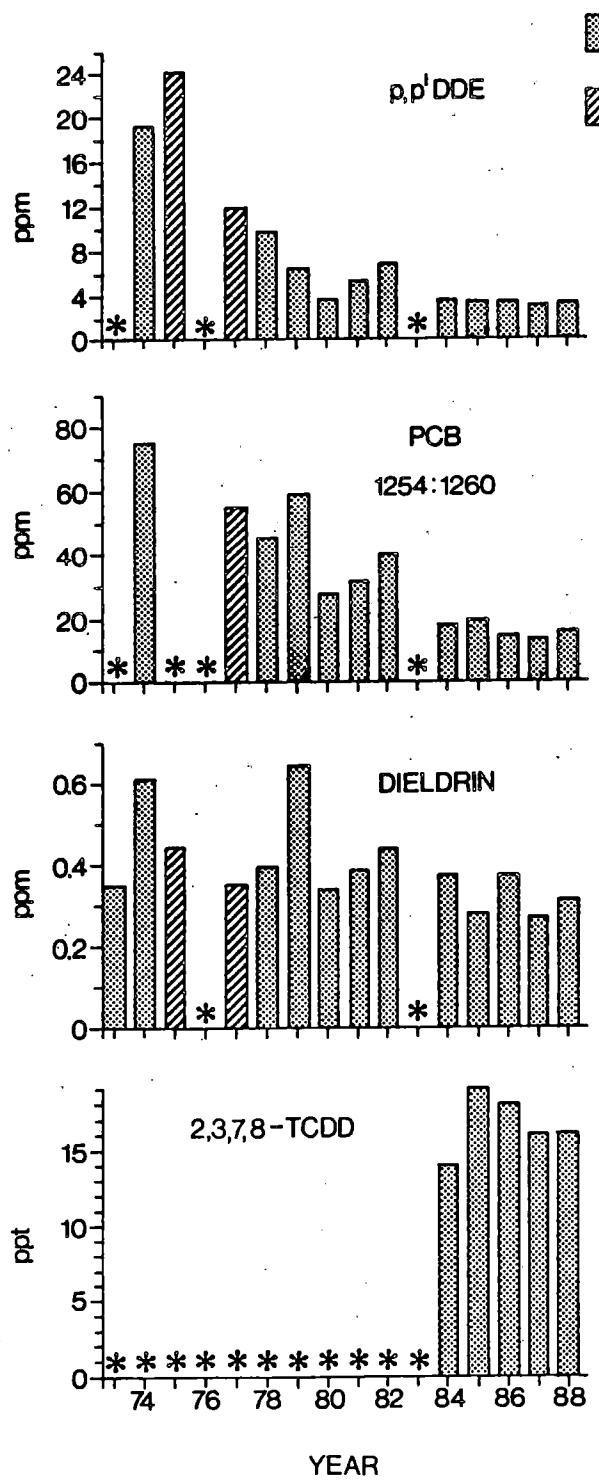
■ Mammaintse Harbour

▨ Agawa Rock

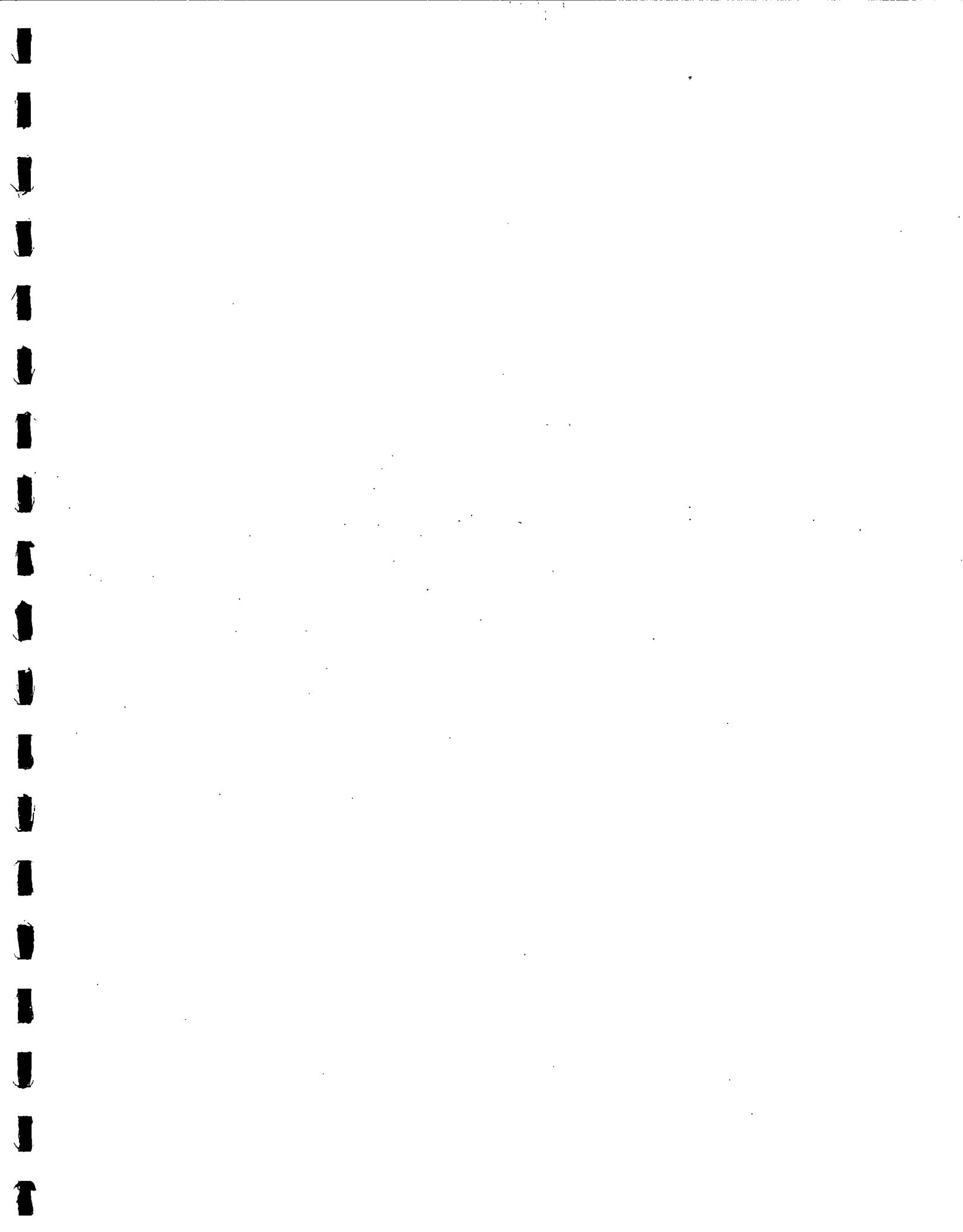


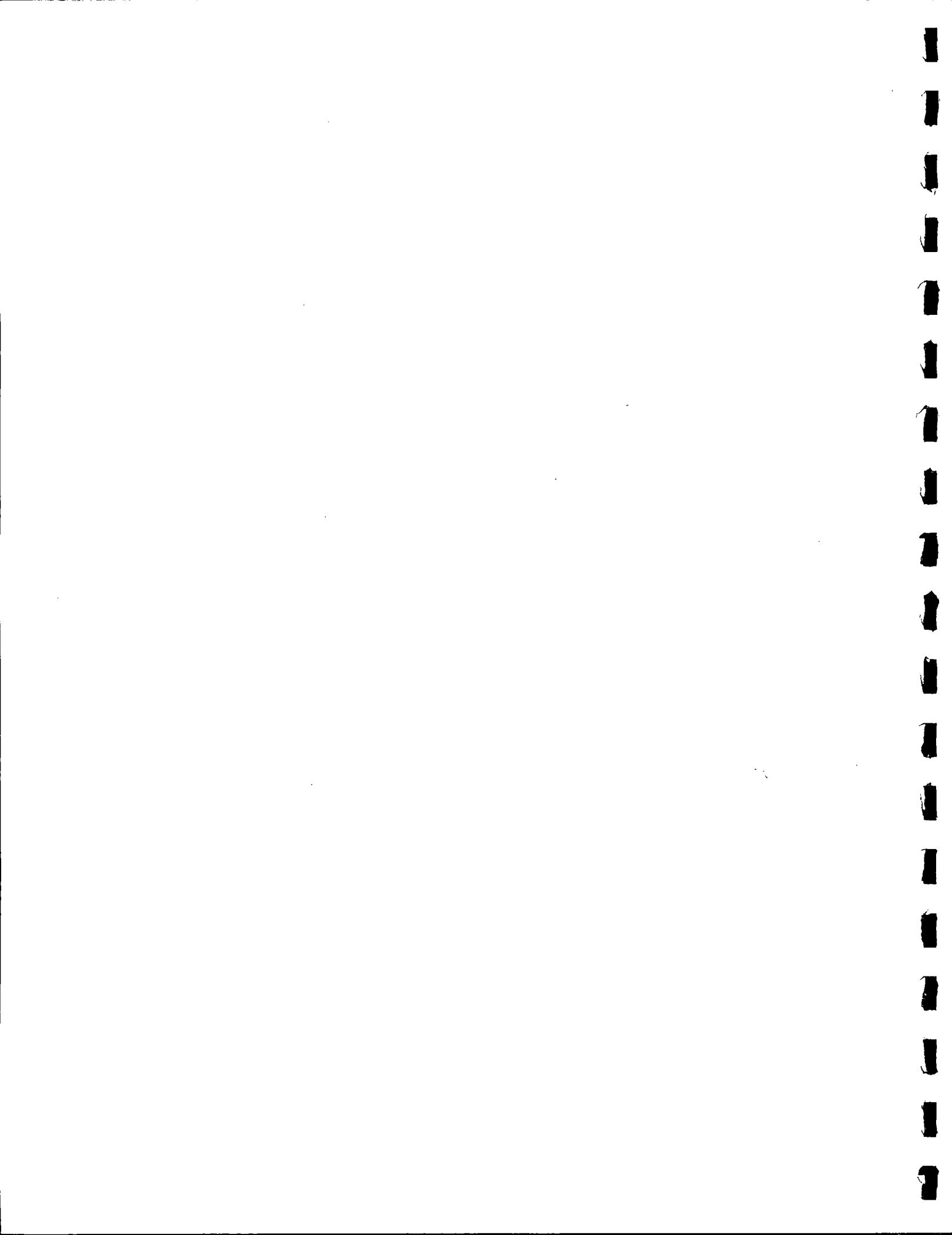
* - Indicates no data

Figure 24. Trends in mean concentrations of p,p'-DDE, dieldrin, PCB 1254:1260 and 2,3,7,8-TCDD in Herring Gull eggs from Granite Island and Silver Islet, Lake Superior (1973-1988).



* - Indicates no data





Section 4.

Species Accounts:

Herring Gull
Double-crested Cormorant
Caspian Tern
Common Tern
Black-crowned Night-Heron
Ring-billed Gull
Forster's Tern

The following accounts introduce population trends for each species, and temporal and geographic variation of contaminant concentrations in eggs of each species. The contaminant trends discussed pertain mainly to "major" contaminants (DDT, p,p'-DDE (DDE), hexachlorobenzene (HCB), mirex, dieldrin, heptachlor epoxide and polychlorinated biphenyl (PCB) 1254:1260) although other compounds are included. Not all of these contaminants are discussed in every species account due to the varying sources of information which were used to compile these summaries. The reader should refer to the references cited for more detailed information concerning each species.

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HERRING GULL (*Larus argentatus*)

Distribution, Abundance, and Population Trends

The Herring Gull nests in all five Great Lakes and connecting channels. This species is the second most abundant fish-eating colonial waterbird nesting on the Great Lakes (Blokpoel and Scharf, 1991) and it is also the most abundant colonial waterbird nesting on Lake Superior (Blokpoel, unpublished) and in western Lake Erie (Weseloh et al., 1988a).

Breeding population censuses for the Canadian and U.S. Great Lakes in 1976-1980 reported 75015 nests (Weseloh et al., 1986). During a 19 year period, 1960-62 to 1980, in the Canadian colonies of Lake Huron, populations increased at an average annual rate of 1.6% (Weseloh et al., 1986); on Canadian western Lake Erie, during the five year period of 1979-1984, the population increased 78.2% (Weseloh et al., 1988a). In Lake Ontario between 1976 and 1987, numbers had increased from 519 to 1540 nests (33.7%) (Blokpoel and Scharf, 1991). In the U.S. Great Lakes colonies, populations increased 8.2% between 1976 and 1977 (Scharf et al., 1978).

In 1989, a census of colonial waterbirds in the Canadian portions of Lakes Huron and Superior recorded 24628 and 11496 Herring Gull nests, respectively (Blokpoel and Tessier, 1991). The Herring Gull was the most numerous among five colonial waterbird species inventoried. Between 1980 and 1989, Herring Gull numbers in Canadian Lake Huron have increased from 24268 to 33547 nests and in Lake Superior have increased from 6136 nests to 11496 nests (Blokpoel and Tessier, 1991).

Table 12. Years and sites of collection of Herring Gull eggs.

<u>Sample year</u>	<u>Collection Site</u>
1971	Scotch Bonnet Isl. (L. Ont.) Big Sister Isl. (L. Michigan)
1972	Scotch Bonnet Isl. (L. Ont.) Pigeon Isl. (L. Ont.) Fighting Isl. (Detroit R.) Big Sister Isl. (L. Michigan)
1973	West Brothers Isl. (L. Ont.) Big Sister Isl. (L. Michigan) Granite Isl. (L. Superior) Silver Islet (L. Superior)
1974	West Brothers Isl. (L. Ont.) Scotch Bonnet Isl. (L. Ont.) Mugg's Isl. (L. Ont.) Port Colborne Lighthouse (L. Erie) Middle Isl. (L. Erie) Chantry Isl. (L. Huron) Double Isl. (N. Chan/L. Huron) Big Sister Isl. (L. Michigan) Mammainse Harbour (L. Superior) Granite Isl. (L. Superior)
1975	West Brothers Isl. (L. Ont.) Mugg's Isl. (L. Ont.) Port Colborne Lighthouse (L. Erie) Middle Isl. (L. Erie) Chantry Isl. (L. Huron) Double Isl. (N. Chan/L. Huron) Mammainse Harbour (L. Superior) Silver Islet (L. Superior)
1976	Scotch Bonnet Isl. (L. Ont.) Gull Isl. (L. Ont.) South Limestone I. (Georg. Bay) Big Sister Isl. (L. Michigan) Granite Isl. (L. Superior)
1977	Snake Isl. (L. Ont.) Scotch Bonnet Isl. (L. Ont.) Gull Isl. (L. Ont.) Mugg's Isl. (L. Ont.)

Table 12 (continued)

Sample year

1977 (continued)

1978

Collection Site
Port Colborne
Lighthouse (L.Erie)
Middle Isl. (L.Erie)
Chantry Isl. (L.Huron)
Double Isl. (N.Chan/L.Huron)
Hat Island-Green Bay
(L.Michigan)
Little Sister Isl. (L.Michigan)
Big Sister Isl. (L. Michigan)
Mammainse Harbour (L.Superior)
Silver Islet (L. Superior)

1979

Snake Isl. (L.Ont.)
Leslie St. Spit (L.Ont.)
Mugg's Isl. (L.Ont.)
Scotch Bonnet Isl. (L. Ont)
Gull Isl. (L. Ont.)
Port Colborne
Lighthouse (L.Erie)
Mohawk Isl. (L.Erie)
Middle Isl. (L.Erie)
Middle Sister Isl. (L.Erie)
Fighting Isl. (Detroit R.)
Chantry Isl. (L.Huron)
Double Isl. (North
Chan./L.Huron)
Gull Isl. (L.Michigan)
Bellows Isl. (L.Michigan)
Big Sister Isl. (L. Michigan)
Mammainse Harbour (L.Superior)
Agawa Rock (L.Superior)
Granite Isl. (L. Superior)

Snake Isl. (L.Ont.)
Scotch Bonnet Isl. (L.Ont.)
Mugg's Isl. (L.Ont.)
Niagara River
Port Colborne
Lighthouse (L.Erie)
Sandusky Harbour
(L. Erie)
Middle Isl. (L.Erie)
Fighting Isl. (Detroit R.)
Chantry Isl. (L.Huron)
Double Isl. (North
Chan./L.Huron)
Gull Isl. (L.Michigan)
Big Sister Isl. (L. Michigan)
Agawa Rock (L.Superior)

Table 12 (continued)

Sample year

1980

Collection Site

Snake Isl. (L.Ont.)
Scotch Bonnet Isl. (L.Ont.)
Gull Isl. (L.Ont.)
Mugg's Isl. (L.Ont.)
Port Colborne
 Lighthouse (L.Erie)
Middle Isl. (L.Erie)
Chantry Isl. (L.Huron)
Manitoba Reef (L.Huron)
Black River (L.Huron)
Little Charity Isl. (L.Huron)
Channel Shelter Isl. (L.Huron)
Nottawasaga Island (Georg.Bay)
Castle Rock (Georg.Bay)
Double Isl. (North Chan./L.Huron)
Pumpkin Point (North Chan./L.Huron)
Gull Isl. (L.Michigan)
Big Sister Isl. (L. Michigan)
Agawa Rock (L.Superior)
Granite Isl. (L. Superior)

1981

Snake Isl. (L.Ont.)
Pigeon Isl. (L.Ont.)
Little Galloo Isl. (L.Ont.)
Scotch Bonnet Isl. (L.Ont.)
Mugg's Isl. (L.Ont.)
Hamilton Harbour (L.Ont.)
Niagara River
Port Colborne
 Lighthouse (L.Erie)
Middle Isl. (L.Erie)
Fighting Isl. (Detroit R.)
Chantry Isl. (L.Huron)
Channel Shelter Isl. (L.Huron)
Double Isl. (North Chan./L.Huron)
Gull Isl. (L.Michigan)
Agawa Rock (L.Superior)
Granite Isl. (L. Superior)

Table 12 (continued)

Sample year
1982

Collection Site

Snake Isl. (L.Ont.)
Pigeon Isl. (L.Ont.)
Little Galloo Isl. (L.Ont.)
Scotch Bonnet Isl. (L.Ont.)
Gull Isl. (L.Ont.)
Hamilton Harbour (L.Ont.)
Muggs Isl. (L. Ont.)
Port Colborne
 Lighthouse (L. Erie)
Niagara River
Middle Isl. (L.Erie)
Fighting Isl. (Detroit R.)
Chantry Isl. (L.Huron)
Channel Shelter Isl. (L.Huron)
Double Isl. (North
Chan./L.Huron)
Gull Isl. (L.Michigan)
Big Sister Isl. (L. Michigan)
Agawa Rock (L.Superior)
Granite Isl. (L. Superior)

1983

Snake Isl. (L.Ont.)
Mugg's Isl. (L.Ont.)
Niagara River
Port Colborne
 Lighthouse (L. Erie)
Middle Isl. (L.Erie)
Fighting Isl. (Detroit R.)
Chantry Isl. (L.Huron)
Channel Shelter Isl. (L.Huron)
Double Isl. (North
Chan./L.Huron)
Gull Isl. (L.Michigan)
Big Sister Isl. (L. Michigan)
Chene Isl. (L.Superior)
Gull Isl. (L. Superior)
Agawa Rock (L. Superior)
Papoose Isl. (L. Superior)
Leadman Isl. (L. Superior)
Huron Isl. (L. Superior)
Lake Linden (L. Superior)
Knife Isl. (L. Superior)

Table 12 (continued)

Sample year

1984

Collection Site

Snake Isl. (L.Ont.)
Mugg's Isl. (L.Ont.)
Hamilton Harbour (L.Ont.)
Niagara River
Port Colborne
 Lighthouse (L.Erie)
Middle Isl. (L.Erie)
Fighting Isl. (Detroit R.)
Chantry Isl. (L.Huron)
Channel Shelter Isl. (L.Huron)
Double Isl. (North Chan./L.Huron)
Gull Isl. (L.Michigan)
Fish Isl. (L.Michigan)
Gravel Isl. (L.Michigan)
Spider Isl. (L.Michigan)
Big Sister Isl. (L. Michigan)
Agawa Rock (L.Superior)
Granite Isl. (L. Superior)

1985

Snake Isl. (L.Ont.)
Mugg's Isl. (L.Ont.)
Niagara River
Port Colborne
 Lighthouse (L.Erie)
Middle Isl. (L.Erie)
Fighting Isl. (Detroit R.)
Chantry Isl. (L.Huron)
Channel Shelter Isl. (L.Huron)
Double Isl. (N.Chan/L.Huron)
Pumpkin Point (North Chan./L.Huron)
Gull Isl. (L.Michigan)
Big Sister Isl. (L. Michigan)
Agawa Rock (L.Superior)

1986

Strachan Isl. (St.Lawrence R.)
Snake Isl. (L.Ont.)
Mugg's Isl. (L.Ont.)
Hamilton Harbour (L.Ont.)
Niagara River
Port Colborne
 Lighthouse (L.Erie)
Middle Isl. (L.Erie)
Fighting Isl. (Detroit R.)
Chantry Isl. (L.Huron)
Channel Shelter Isl. (L.Huron)
Double Isl. (North Chan./L.Huron)
Trout Isl. (L.Michigan)

Table 12 (continued)

Sample year

1987

Collection Site

Big Sister Isl. (L. Michigan)
 Agawa Rock (L. Superior)
 Granite Isl. (L. Superior)
 Gull Isl. (L. Superior)

Snake Isl. (L. Ont.)
 Mugg's Isl. (L. Ont.)
 Hamilton Harbour (L. Ont.)
 Port Colborne
 Lighthouse (L. Ont.)
 Niagara River
 Middle Isl. (L. Erie)
 Fighting Isl. (Detroit R.)
 St. Clair River
 Chantry Isl. (L. Huron)
 Channel Shelter Isl. (L. Huron)
 Double Isl. (N. Channel/L. Huron)
 Gull Isl. (L. Michigan)
 Big Sister Isl. (L. Michigan)
 Agawa Rock (L. Superior)
 Granite Isl. (L. Superior)

1988

Strachan Isl. (St. Lawrence R.)
 Snake Isl. (L. Ont.)
 Leslie St. Spit (L. Ont.)
 Niagara River
 Port Colborne
 Lighthouse (L. Erie)
 Middle Isl. (L. Erie)
 Fighting Isl. (Detroit R.)
 Chantry Isl. (L. Huron)
 Channel Shelter Isl. (L. Huron)
 Double Isl. (North Chan./L. Huron)
 Gull Isl. (L. Michigan)
 Big Sister Isl. (L. Michigan)
 Agawa Rock (L. Superior)
 Granite Isl. (L. Superior)

Contaminant trends examined

In a review of temporal and spatial trends of contaminants occurring in Herring Gull eggs, Weseloh (unpublished) evaluated sixteen toxic chemicals for the period 1974-1985. (see also

Weseloh et al., 1979; Mineau et al., 1984; IJC, 1987). The following is a summary of results and discussion of contaminant trends from that report and a brief description of trends in 1986-1988.

Of the sixteen contaminants examined, six are referred to as "major contaminants": p,p'-DDE, dieldrin, heptachlor epoxide (HE), hexachlorobenzene (HCB), mirex and PCB 1254:1260. These contaminants were designated as such due to the very high levels occurring in Herring Gull eggs at the beginning of the study. "Minor" contaminants included all the tri- and tetrachlorobenzenes measured, pentachlorobenzene, oxy-chlordane, photo-mirex, and alpha- and beta-hexachlorocyclohexane. These were added to the analysis protocol in 1977 or later and in some cases, were eventually dropped from the protocol.

Colonies for which data have been analyzed are known as Great Lakes annual monitor colonies. These colonies are: Snake Isl. (L.Ont.), Mugg's Isl.(L.Ont.), Port Colborne Lighthouse (L.Erie), Middle Isl. (L.Erie), Chantry Isl.(L.Huron), Channel Shelter Isl.(L.Huron), Double Isl.(N.Channel/L.Huron), Gull Isl.(L.Michigan), Agawa Rock (L.Superior), and Granite Island (L.Superior).

Temporal variation in contaminant concentrations

During the twelve year period, 1974-1985, the maximum concentrations of all major contaminants at each site occurred in 1974 and/or 1975. The minimum concentration of most major contaminants occurred during 1983-1985. The minor compounds did not show the same uniformity among years for maximum and minimum concentrations.

By 1985, levels of three of the six major contaminants (DDE, mirex, and HCB) were reduced by at least 75% of what they were in 1974 at more than half of the sites. Again, minor contaminants did not show such widespread and extreme reduction since their first assessment although most have declined. In 1985, nearly all colony-compound comparisons were at some level less than 100% of what they were when first analyzed. For some, the reduction was quite marked (i.e. 44-94% for DDE, mirex and HCB). Only three compounds showed any increase between the time when they were first analyzed and 1985: oxy-chlordane, 1,2,3,4-tetrachlorobenzene and alpha-hexachlorocyclohexane. This comparison does not necessarily reflect what has happened during the intervening years of analysis, but only the change between the end points (1974/1985).

Regression analyses were carried out on 108 colony-contaminant data sets (13 compounds with 4 or more years of data x 9 colonies). In years for which sufficient data are available, all 13 compounds (DDE, dieldrin, heptachlor epoxide, photo-mirex,

mirex, HCB, PCB 1254:1260, o-chlordane, 1,2,3,4-tetrachlorobenzene, pentachlorobenzene, 1,2,3,5/1,2,4,5-tetrachlorobenzene, a-hexachlorocyclohexane, b-hexachloro-cyclohexane) showed a significant decrease on one or more colony sites. Only o-chlordane and a-HCH showed any increase and these occurred at one colony site each. Seventy (65%) of the 108 colony comparisons show a significant decline, 36 (33%) showed no change and 2 (2%) showed an increase.

During 1986-1988 some major contaminants (DDE, PCB 1254:1260, mirex, HCB, and dieldrin) increased in 1987 and decreased in 1988. The sites where these changes occurred were scattered throughout the lakes. DDE levels at Snake and Mugg's Island (Lake Ontario), Port Colborne Lighthouse (Lake Erie), and Gull Island (Lake Michigan) experienced these changes. These changes were also noted in PCB 1254:1260 at Snake and Mugg's Islands; Port Colborne Lighthouse, and Channel and Double Islands (Lake Huron); mirex at Snake Island, and Channel Island; photo-mirex at Port Colborne Lighthouse, and Middle Island, Channel Island and Double Island; hexachlorobenzene at Mugg's Island and Double Island; dieldrin at Double Island and Gull Island; and heptachlor epoxide at Agawa Rock (Lake Superior).

All the minor contaminants measured, except photo-mirex, and all other major contaminants did not show any substantial change during 1986-1988.

Geographic variation in contaminant concentrations

A Kruskal-Wallis one way ANOVA was used to determine significant rankings of contaminant levels among colonies over 3-4 year periods. For the major contaminants, the periods were 1974-78 (4 years of data), 1979-81 (3 years) and 1982-85 (4 years). For the minor contaminants the latter two periods were used when data were available.

Mean rank scores (N=3) over all time periods indicated that Herring Gull eggs from the two Lake Huron colonies (Double and Chantry Islands) and the colony in western Lake Erie (Middle Island) had the lowest overall mean ranks (lowest concentrations) for both major and minor contaminants. The Lake Ontario colonies (Snake and/or Mugg's Islands) and one of the colonies in Lake Superior (Agawa Rock) usually had the highest overall concentrations. Although Lake Superior colonies are not highly contaminated with major contaminants, the concentrations of minor contaminants at Agawa Rock are second to those in Lake Ontario colonies. Hence, the high ranking for the Lake Superior colony.

The Lake Michigan colony (Gull Island) consistently had the highest residue levels for DDE, dieldrin, HE and oxy-chlordane. The Lake Ontario colonies had the highest levels for mirex, HCB, PCBs, 1,2,3,4-tetrachlorobenzene, pentachlorobenzene, 1,2,3,5/

1,2,4,5- tetrachlorobenzene and beta-hexachlorocyclohexane.

Summary/Discussion

From 1974 until 1988, levels of DDE, mirex and HCB in Herring Gull eggs from the Canadian Great Lakes have decreased over 80%; levels of PCBs have decreased 69% while levels of dieldrin have declined 50%. Levels of 2378-TCDD, which have been monitored only since 1981, have decreased 73%. There has been a significant decline in the levels of DDE, HCB and PCBs in Herring Gull eggs from all nine colonies where data was sufficient for statistical analysis. Mirex and dieldrin have decreased significantly on seven of nine and six of nine colonies, respectively.

In general, contaminant levels in Herring Gull eggs decreased dramatically from the mid to late 1970's. There was a notable and still unexplained increase in many contaminant values in 1981-82. Since that time, the levels have stabilized or continued their decline but declines have not been as rapid in the 1980s as during the late 1970s.

DOUBLE-CRESTED CORMORANT (Phalacrocorax auritus)
Distribution, Abundance, and Population Trends

Since the first confirmed breeding record of this species in 1920 in Lake Superior, cormorants have spread eastward throughout the Great Lakes (Cadman et al., 1987). During the 1940s, the species was so common that controls were instituted because it was deemed a competitor with local commercial fisheries (Omand, 1947). From ca. 1946 to 1975, cormorant populations on the Great Lakes seriously declined due to the cumulative effects of first, the control program, and subsequently, DDT-induced eggshell thinning (Price and Weseloh, 1986). In the late 1970s, DDT levels had declined markedly in cormorant eggs. This species has made tremendous gains in numbers on the Great Lakes which has coincided with the decline in DDT levels. From 1981 to 1985, the Canadian Wildlife Service documented a 270% (3359 nests) increase in the number of cormorant nests on the Great Lakes (Cadman et al., 1987). In 1984, on the Canadian side of Lake Huron, Superior and all of Lakes Ontario and Erie, there were 3659 nests and in 1988, this total had increased to 11093 nests.

Table 13. Years and sites of collections of Double-crested Cormorant eggs.

<u>Year</u>	<u>Collection Site</u>
1970	Blackbill Island (Georgian Bay)
1971	Wallis Rock (Georgian Bay) Blackbill Island (Georgian Bay) Talon Rock (N.Channel/Lake Huron) Doucet Rock (N.Channel/Lake Huron)
1972	Big Chicken Island (Lake Erie) Wallis Rock (Georgian Bay) Gull Rock (N.Channel/Lake Huron) Talon Rock (N.Channel/Lake Huron) Bustard Rock (N.Channel/Lake Huron) Doucet Rock (N.Channel/Lake Huron) Scotch Bonnet Island (Lake Ontario)
1973	Wallis Rock (Georgian Bay) Africa Rock (N.Channel/Lake Huron)
1975	Gull Rock (N.Channel/Lake Huron) Africa Rock (N.Channel/Lake Huron) Doucet Rock (N.Channel/Lake Huron) Scotch Bonnet Island (Lake Ontario)
1979	Big Chicken Island (Lake Erie) Africa Rock (N.Channel/Lake Huron)
1981	Pigeon Island (Lake Ontario) Little Galloo Island (Lake Ontario) Big Chicken Island (Lake Erie)
1983	Big Chicken Island (Lake Erie) Gravel Island (Lake Superior)

Contaminant trends examined

Levels of organochlorine contaminants in Great Lakes cormorant eggs were first monitored in the late 1960s. At that time, eggs were heavily contaminated with DDE, PCBs and mercury, and various parameters of breeding success were low and declining (Vermeer and Peakall, 1977a,b; Postupalsky, 1978). The data analysis presented here and by Weseloh (unpublished) examine temporal and geographic variations in residue levels in Double-crested Cormorant eggs at colonies in the Canadian Great Lakes only during 1971-1981.

Temporal variation in contaminant concentrations

Significant increases and decreases occurred in concentrations of eight compounds (PCB 1260, DDE, mercury, dieldrin, DDD, DDT, hexachlorobenzene (HCB), heptachlor epoxide (HE)) measured in cormorant eggs in 1972, and again in 1979 for three colonies on Lake Huron (Africa, Doucet and Gull Rocks) and Big Chicken Island (Lake Erie). A significant decrease in DDE, and DDT levels occurred in Lake Huron colonies. Mercury decreased significantly in the Lake Erie colony, and increased, but not significantly, in Lake Huron. Levels of PCB 1260, HCB and heptachlor epoxide increased significantly in Lake Erie. Levels of PCB 1260 decreased and heptachlor epoxide increased at Lake Huron but these changes were not significant. Dieldrin levels decreased at Lake Huron, and increased at Lake Erie but not significantly in either case (Weseloh, unpublished).

Geographic variation in contaminant concentrations

Analysis of variance (ANOVA) and Student-Neuman Keul tests were applied to contaminant data (PCB 1260, DDE, DDT, heptachlor epoxide(HE), HCB, mirex) from colonies in 1971, 1972, 1979, and 1981.

In 1971, levels in eggs from Talon Rock (N.Channel/Lake Huron), Wallis Rock (Georgian Bay/Lake Huron), and Blackbill Islands (Georgian Bay/Lake Huron) were compared. The Wallis Rock colony had significantly higher levels of DDT and HCB than detected elsewhere. Levels of other contaminants did not vary significantly between sites.

Analysis of contaminant data from 1972, for sites described above, indicate that the range of DDE, DDT and heptachlor epoxide among colonies was significantly different overall but no single site had levels that differed significantly from any other. In each case, the lowest values were obtained from Big Chicken Island (Lake Erie) and the highest values occurred in colonies in the North Channnel and Georgian Bay.

All the major contaminants were detected in eggs collected in 1979, but levels were not significantly different among the colonies except for PCB and mirex levels. In Lake Erie eggs, PCB 1260 was detected in significantly higher concentrations than in eggs from Lake Huron colonies. However, mirex levels were significantly higher in Lake Huron eggs.

In 1981, levels of PCBs were significantly lower at Pigeon Island (Lake Ontario) than at all other colonies sampled. However, Little Galloo Island (Lake Ontario) had significantly higher mirex concentrations than those found at at Pigeon Island, which in turn, had higher levels than at Big Chicken Island (Lake Erie).

Summary/Discussion

The Double-crested Cormorant has experienced tremendous changes in population numbers in the past twenty years which are attributed to changes in DDT levels in their eggs. Trends in contaminants in this species generally coincide with that found in gulls and terns in the Great Lakes, but this species and the Black-crowned Night-Heron exhibited the most sensitivity to the effects of DDT. Although decreases in DDT levels have allowed the population to increase dramatically in recent years, deformities such as crossed bills, clubfeet, edema, and gastroschisis are occurring in higher numbers in cormorant populations in Green Bay, Lake Michigan and Saginaw Bay, Lake Huron (Gilberston et al., 1991) than in any of the Canadian cormorant colonies (Weseloh and Ross, unpublished). This is believed to be linked to contaminant exposure.

CASPIAN TERN (*Sterna caspia*)
Distribution, Abundance and Population Trends

Caspian Tern numbers have been increasing in the Canadian Great Lakes over the past twenty years. However, the distribution of the Caspian Tern is limited in Canada in that the species only occurs in Lakes Huron and Ontario. Colonies are also present in Lake Michigan.

In 1962, 610 pairs of Caspian Terns nested in the Canadian waters of Lakes Huron, and Superior, and 525 pairs nested in the American waters of Lakes Huron, Superior, and Michigan (Ludwig, 1962). A survey of the U.S. Great Lakes in 1976-77 found Caspian Tern colonies located only in Lake Michigan (Scharf et al., 1978). In 1976, 1046 nests were present in Lake Michigan. This number decreased slightly to 998 nests in 1977 for colonies that were active and undisturbed in both years.

In 1980, 2138 nests of Caspian Terns (*Sterna caspia*) were counted throughout eight colonies in Canadian Lake Huron (Weseloh et al., 1986). This reflects a probable increase of 50% in the population size during the previous decade. The increase was mainly due to the establishment of two new colonies in Lake Huron during that period.

In Lake Ontario, an increase from 44 nests to 708 occurred during 1976 to 1987 (Blokpoel and Scharf, 1991). Further growth of the Caspian Tern population is predicted during the next few years (Blokpoel and Scharf, 1991).

Table 14. Years and sites of collections of Caspian Tern eggs.

<u>Year</u>	<u>Collection sites</u>
1972	South Limestone Island (Lake Huron)
1980	South Limestone Island (Lake Huron) Half Moon Island (Lake Huron) Cousins Island (Lake Huron) Isle Aux Galets (Lake Michigan) Gravelly Island (Lake Michigan) Hat Island (Lake Michigan)
1981	Pigeon Island (Lake Ontario)

Contaminant trends examined

Struger and Weseloh (1985a) provide the first and only discussion of environmental contaminants in this species as they relate to reproductive success parameters from the Great Lakes. The following summary is a condensation of their analysis of spatial and temporal variation of DDE, mirex, hexachlorobenzene and PCB 1254:1260.

Temporal variation in contaminant concentrations

South Limestone Island (Georgian Bay) is the only site where Caspian Tern eggs were collected in more than a single year. Of the three contaminants detected in eggs in both 1972 and 1980 at South Limestone Island (DDE, HCB and PCB 1260), DDE and PCB 1260 showed significant declines and the third, HCB, which occurred in trace amounts, showed no change in concentration.

Geographic variation in contaminant concentrations

In 1980-1981, eggs were collected from three colonies on Lake Huron, three colonies on Lake Michigan, and one colony on Lake Ontario (Table 14).

In 1980, DDE levels were significantly higher at Gravelly Island (Lake Michigan) than at all other sites sampled. There were no significant inter-colony or inter-lake differences in DDE detected among the remaining six sites. Eggs from Pigeon Island (Lake Ontario), had significantly greater concentrations of mirex than in eggs from all other sites on the Great Lakes. Mirex levels were similar at colonies throughout Lake Michigan and Lake Huron with the exception of the significantly higher level at South Limestone Island (Lake Huron). Hexachlorobenzene concentrations were not significantly different among colonies throughout the Great Lakes. Concentrations of PCB 1254:1260 were highest at Pigeon Island but were only significantly higher than levels measured in eggs at one of six colonies, Half Moon Island (Lake Huron).

Summary/Discussion

Caspian Tern eggs from Lakes Ontario and Michigan eggs appear to be the most contaminated. The occurrence of the highest levels of PCBs in Lake Ontario eggs and highest levels of DDE in Lake Michigan eggs among all Great Lakes sampled coincides with geographic variation found in contamination in Herring Gull eggs. Limited sample sites and years of sampling preclude discussion of detailed trends in contamination in Caspian Tern eggs.

COMMON TERN (*Sterno hirundo*)
Distribution, Abundance, and Population Trends

Common Terns nest on all five Great Lakes. At least 58 Common Tern colonies containing 50 or more nests existed during 1900-1980 or were still active in 1980 in the Lower Great Lakes. The estimated numbers of nests were 4000-7000 during 1900-1920 and the numbers peaked at 16000 pairs in the early 1960s. The numbers declined to 5000 pairs in the late 1970s (Courtney and Blokpoel, 1980; 1983). In a comparison of populations of seven species of colonial waterbirds in 1960-62 relative to those in 1980, the Common Tern was the only species whose numbers had declined. Of twenty four colonies for which historical data were available (33.8% of colonies existing in 1980), the population had been reduced by a minimum of 42% from 1960-1962 with an average decline of 3.8% annually. In 1980, 10775 Common Tern nests existed on the Canadian and U.S. Great Lakes (Weseloh et al., 1986). In Lake Ontario, 943 Common Tern nests remained in 1987 in comparison to 1299 nests in 1976. This represents a 2.7% annual decrease in nests during that period (Blokpoel and Scharf, 1991).

In the U.S. Great Lakes, populations of Common Terns declined from 2135 nests in 1976 to 1772 in 1977 (Scharf et al., 1978). In 1980, Common Tern populations on Lake Michigan increased to 1496 pairs from 794 pairs in 1977. This was a result of increased use of man-made nesting sites in 1980 (Shugart and Scharf, 1983).

Reductions in Common Tern populations, especially in the Lower Great Lakes, are of concern. These decreases have been attributed to their sensitivity to predation by birds and mammals, disturbance by humans and their pets, invasion of natural nesting areas by Ring-billed Gulls, and pollution of the aquatic environment (Courtney and Blokpoel, 1980; 1983; Blokpoel and Scharf, 1991). At this time, pollution is believed to be one of the less significant factors among those that contribute to decreases in Common Tern populations.

Table 15. Years and sites of collection of Common Tern eggs.

<u>Year</u>	<u>Collection site</u>
1971	Hamilton Harbour (Lake Ontario)
1972	Mugg's Island (Lake Ontario) Port Colborne Lighthouse (Lake Erie) Fighting Island (Detroit River) Kettle Point (Lake Huron)
1973	Port Colborne Lighthouse (Lake Erie) Port Colborne Canada Furnace (Lake Erie) Toronto Islands (Lake Ontario)
1975	Gull Island (Lake Ontario)
1979	Fighting Island (Detroit River)
1981	Leslie St. Spit (Lake Ontario) Port Colborne Lighthouse (Lake Erie) Fighting Island (Detroit River) North Limestone Island (Lake Huron)

Contaminant trends examined

The following comparisons of contaminant levels on a temporal basis have been made between the two years for which collections were most extensive, 1972 and 1981. The only year for which geographic comparisons have been made is 1981 (Weseloh et al., 1989).

Temporal variation in contaminant concentrations

Comparisons of DDE and PCB data in 1981 with earlier studies in 1972 indicate decreases of 73.8-87.3% in DDE and PCB 1260 concentrations. At Mugg's Island (Lake Ontario) in 1972 compared to Leslie St. Spit (Lake Ontario) in 1981, DDE and PCB 1260 decreased 80.7% and 84.0% respectively. Similar decreases were evident at Port Colborne (Lake Erie), DDE decreased 82.4% and PCB 1260 decreased 87.3% between 1972 and 1981. At Fighting Island, PCB 1260 decreased 73.8% between 1981 and 1972 (calculated from Weseloh et al., 1989). DDE was not measured in eggs from Fighting Island in 1972.

Geographic variation in contaminant concentration

In 1981, eggs from Leslie St. Spit (Lake Ontario) were more contaminated with DDE, PCB 1254:1260, HCB, dieldrin, and mirex than eggs from Fighting Island (Detroit River), Port Colborne Lighthouse (Lake Erie), and North Limestone Island (Lake Huron). However, DDE, dieldrin and t-nonachlor concentrations in eggs from Leslie St. Spit were not significantly different than those in eggs from North Limestone Island. DDE levels at Fighting Island and Port Colborne were significantly lower than in eggs from Leslie St. Spit and North Limestone Island. PCB concentrations were significantly higher at Leslie St. Spit and Fighting Island than in Port Colborne eggs and concentrations in eggs from these three sites were significantly higher than in eggs from North Limestone Island. Levels of mirex were significantly greater in eggs from Leslie St. Spit. Concentrations of mirex, dieldrin and t-nonachlor in eggs from Port Colborne and Fighting Island were not detectable in more than half the eggs analyzed therefore these data were not included in the statistical analysis.

Eggs from at least one of these colonies also contained detectable levels of oxy-chlordane, cis-chlordane, and toxaphene however less than half of the samples from more than three colonies did not have detectable levels. Therefore statistical analysis was not performed on data for these compounds (Weseloh et al., 1989).

Summary/Discussion

Common Tern eggs have contained lower organochlorine concentrations than neighbouring species, such as Herring Gulls and Caspian Terns (Weseloh et al., 1989).

BLACK-CROWNED NIGHT-HERON (*Nycticorax nycticorax*)
Distribution, Abundance, and Population Trends

From the 1900s until the late 1960s, Black-crowned Night-Herons established nesting colonies throughout the lower Great Lakes. In 1936, well-established colonies were known only in south-western Ontario with a few nesting pairs in Hamilton and Toronto (Baillie and Harrington, 1936). By the 1950s, this species was widespread along the Lower Great Lakes (Baillie, 1951). In the 1970s, the size of the Great Lakes population quickly decreased due to eggshell thinning caused by DDT. The Pigeon Island (Lake Ontario) herony had 78 nests in 1968 but declined to 15 nests in 1973 (Quilliam, 1973) and has since disappeared. Although Black-crowned Night-Heron populations have not been as well documented as other species on the Great Lakes, this decline appeared to occur in all other Great Lakes colonies (Cadman et al., 1987).

The population decline in the Great Lakes was followed by a period of recovery during the 1980s (Cadman et al., 1987). The estimated total number of nests in Ontario was 8430 in the early 1980s (Peck and James, 1983), the majority of which occurred on the lower Great Lakes (Cadman et al., 1987). Black-crowned Night-Herons appear to be increasing again in their distribution and abundance in the Great Lakes (Burgess et al., unpublished).

Table 16. Years and sites of collections of Black-crowned Night-Heron eggs.

<u>Year</u>	<u>Collection Site</u>
1972	Pigeon Island (Lake Ontario)
1982	Pigeon Island (Lake Ontario) Little Galloo Island (Lake Ontario) Niagara River Middle Island (Lake Erie) Chantry Island (Lake Huron)
1986	Niagara River Middle Island (Lake Erie) Walpole Island (Lake St.Clair)

Contaminant trends examined

Temporal changes in contaminant levels in eggs from Pigeon Island (Lake Ontario) in 1972 to 1986, and Middle Island (Lake Erie) and the Niagara River in 1982 to 1986 were examined.

The only report discussing geographic variation in contaminant levels in eggs of Black-crowned Night-Herons from the Great Lakes concerns five heronries sampled in 1982 (Weseloh et al., 1986). Only data from 1982 have been analyzed since only one colony/year had been sampled in other years, except in 1986, and in that year statistical analysis was deemed inappropriate because there was only a single egg collected from each herony.

Temporal variation in contaminant concentrations

In 1972, seven organochlorine residues as well as mercury were detected in Night-Heron eggs. By 1986, mercury was not detectable however a total of 19 organochlorine chemicals were found in eggs in all three heronries sampled. Thus, while mercury dropped to non-detectable levels between 1972 and 1982, there was an increase in the array of detectable contaminants. Among the chemicals found in eggs in both 1972 and 1982 at Pigeon Island, DDE, PCB 1260 and hexachlorobenzene had all declined between the two sample years by greater than 50%. However, by 1982, dieldrin showed no change, and DDT and heptachlor epoxide had increased by greater than 500% as compared to 1972.

In Lake Erie at Middle Island, 11 of 13 compounds (a-and o-chlordane, HCB, DDE, DDD, DDT, dieldrin, heptachlor epoxide, b-hexachlorocyclohexane, mirex, t-nonachlor, PCB 1260, and PCB 1254:1260) decreased in concentration between 1982 and 1986, some as much as 88%, and 2 of the 13 compounds showed no change in concentration. At the Niagara River and between the same years, only 6 of 13 chemicals decreased, 2 chemicals increased in concentration, and 5 did not show any substantial change. The chemicals t-nonachlor and PCB 1254:1260 increased 268.5% and 76.5% respectively.

Geographic variation in contaminant concentrations

Eggs from Pigeon and Middle islands were analyzed individually while eggs from Niagara River, Little Galloo Island and Chantry Island were analyzed as pooled samples. Therefore statistical analysis is limited to comparisons between Pigeon and Middle Islands.

DDE and mirex levels were significantly higher at Pigeon Island than at Middle Island. Residue levels for all other compounds measured (dieldrin, heptachlor epoxide, o-chlordane, a-hexachlorocyclohexane, b-hexachlorocyclohexane, 1234-tetrachlorobenzene, 1235/1245-tetrachlorobenzene, penta-

chlorobenzene, hexachlorobenzene, and PCB 1254:1260) were not significantly different between the two colonies.

The Niagara River and/or Pigeon Island had the highest levels of all contaminants compared to all other colonies. Following these two sites, Little Galloo Island, Chantry Island, and Middle Island were ranked most to least contaminated.

Summary/Discussion

Most contaminant levels in Black-crowned Night-Heron eggs have been reduced greatly in Lake Ontario since the early seventies although decreases in the eighties have not been pronounced. There have also been some notable increases in certain compounds at both the Pigeon Island and Niagara River colonies.

As with the Herring Gull data, contaminant levels in Night-Heron eggs in Lake Ontario are higher than those in Lake Erie and Lake Huron.

RING-BILLED GULL (*Larus delawarensis*)
Distribution, Abundance, and Population Trends

The population of the Ring-billed Gulls on the Great Lakes were fairly stable from 1940 to 1960 and was estimated at 27 000 pairs (Ludwig, 1974). By 1967, populations had increased five-fold to 141 000 pairs and the species had extended its breeding range from Lake Ontario and Huron to Lake Michigan (Blokpoel and Tessier, 1986). Nesting populations had increased to 281 000 by 1976 on the entire Great Lakes. In 1984, the estimated population had more than doubled again to 648 000 pairs. This represents an average annual increase of 11% from 1976-1984 (Blokpoel and Tessier, 1986). Nest counts since 1984 in the Great Lakes have not indicated any signs of population decline for this species and it is now considered by some as a problem species in the Great Lakes.

Table 17. Years and sites of collections of Ring-billed Gull eggs.

<u>Year</u>	<u>Collection Site</u>
1979	Mugg's Island (Lake Ontario) Fighting Island (Detroit River)
1984	Hamilton Harbour (Lake Ontario) Fighting Island (Detroit River)

Contaminant trends examined

Student t-tests were applied to contaminant concentrations to assess differences in the levels among sites in Lake Ontario and the Detroit River in 1979 and 1984.

Temporal variation in contaminant concentrations

Concentrations of all but three compounds measured in both 1984 and 1979 were higher in 1979 at Fighting Island (Detroit River). Compounds measured in both years were DDE, DDT, dieldrin, heptachlor epoxide (HE), PCB 1260, PCB 1254:1260, DDD, mirex, hexachlorobenzene (HCB), a-chlordane, o-chlordane, and b-hexachlorocyclohexane. Levels of HCB, a-chlordane, b-hexachlorocyclohexane were significantly higher in 1979 and levels of o-chlordane, and mirex were significantly higher in 1984. Concentration of HE was higher in 1984 but not significantly different than 1979 levels.

Levels of all chemicals measured in 1979 at Mugg's Island (Lake Ontario) and 1984 at Hamilton Harbour (Lake Ontario) were highest at Mugg's Island except DDE, DDT and o-chlordane. Compounds measured at these sites in both years include all compounds measured at Fighting Island (above) except a-chlordane.

Geographic variation in contaminant concentrations

Concentrations of HE, mirex, photo-mirex, o-chlordane, b-hexachlorocyclohexane, DDD, DDE, DDT, dieldrin, PCB 1260, mirex, PCB 1254:1260, and a-chlordane were measured at Fighting Island and Mugg's Island in 1979. Mugg's Island had higher levels of all compounds than Fighting Island except DDT. Levels of HE, mirex, photo-mirex, o-chlordane, b-hexachlorocyclohexane were significantly higher at Mugg's Island as compared to levels at Fighting Island.

In 1984, Hamilton Harbour had higher concentrations of twelve of eighteen chemicals compared to Fighting Island. The chemicals measured at both sites in 1984 include all of those measured at Mugg's and Fighting Islands in 1979, as well as g-chlordane, 1234-chlorobenzene, pentachlorobenzene, t-nonachlor, a-hexachlorocyclohexane, and 1235/1234-chlorobenzene. Levels of DDD, DDE, PCB 1260, HCB, mirex, a- and g-chlordane, and t-nonachlor were significantly higher at Hamilton compared to Fighting Island. Levels of 1234-chlorobenzene, pentachlorobenzene, 1235/1234-chlorobenzene, a-hexachlorocyclohexane were significantly higher at Fighting Island and b-hexachlorocyclohexane concentrations were about equal at Hamilton Harbour and Fighting Island.

Summary/Discussion

Contaminant levels in Ring-billed Gull eggs have decreased substantially in most cases since their first analysis in 1979. Lake Ontario eggs, in particular, those from Hamilton Harbour, are clearly the most contaminated among the limited number of sites sampled.

Contaminant levels are not measured regularly in this species due to Ring-billed Gulls' migratory habits and more omnivorous diet (Section 4, Table 19, Page 4-13) than the Herring Gull. Hence, among the gull species of the Great Lakes it is more relevant to use Herring Gull eggs as indicators of contamination in forage fish of the Great Lakes.

FORSTER'S TERN (*Sterna forsteri*)

Distribution, Abundance, and Population Trends

The Forster's Tern is endemic to North America, breeding primarily in prairie regions (Godfrey, 1986). There is a small breeding population in the Canadian Great Lakes located at two main areas, Walpole Island (St.Clair River) and Long Point (Lake Erie), with smaller colonies at Kettle Point (Lake Huron), Point Pelee and Rondeau Harbour (Lake Erie) (Cadman et al., 1987). Since 1976, this species has been documented at three locations in Ontario comprised of six colonies and average colony size was six nests (Peck and James, 1983). At Walpole Island, four sub-colonies containing a minimum of 27 nests were found in 1988 (McNicholl, 1988).

Table 18. Years and sites of collections of Forster's Tern eggs.

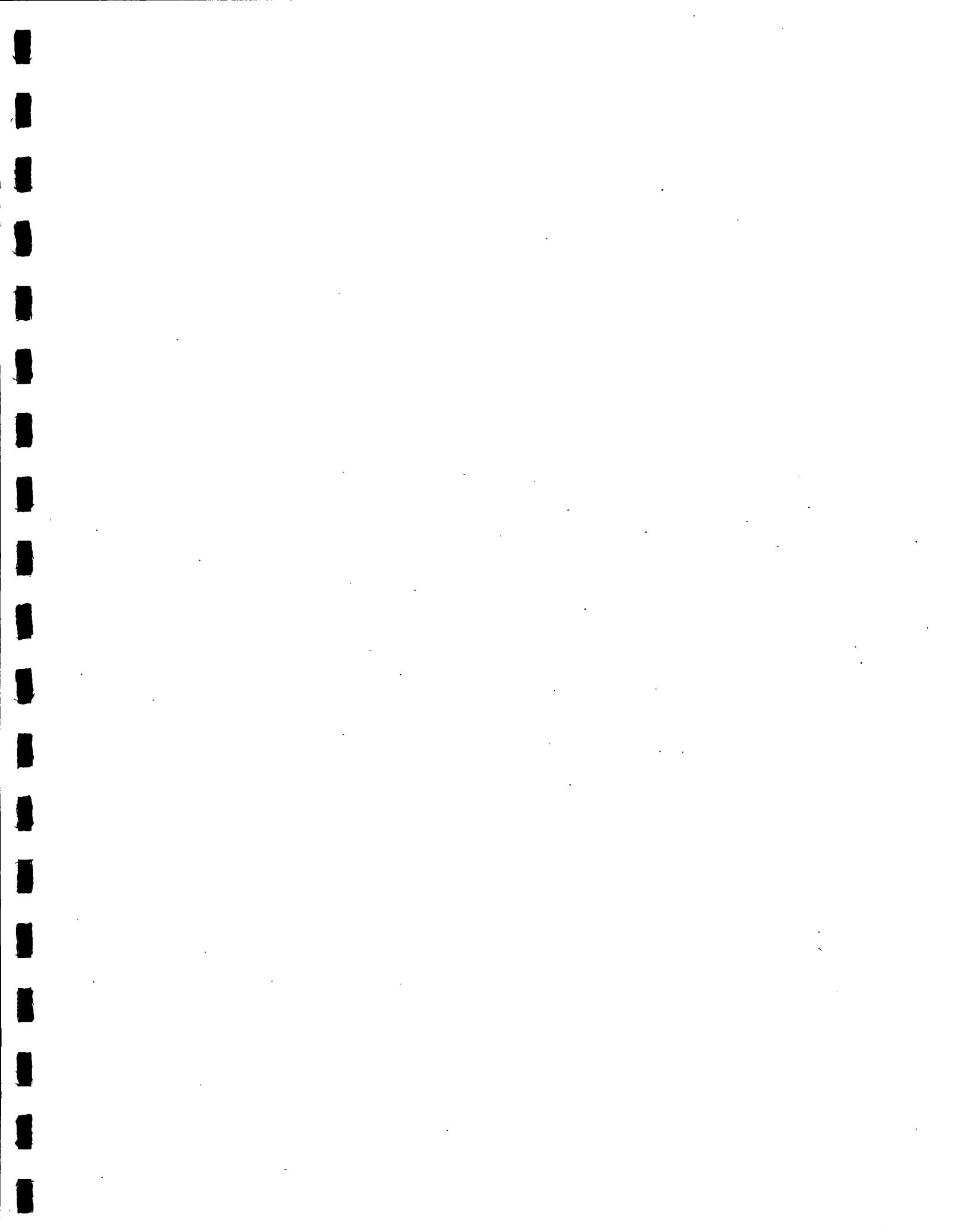
<u>Year</u>	<u>Collection Site</u>
1986	Long Point (Lake Erie) Walpole Island (St.Clair River)

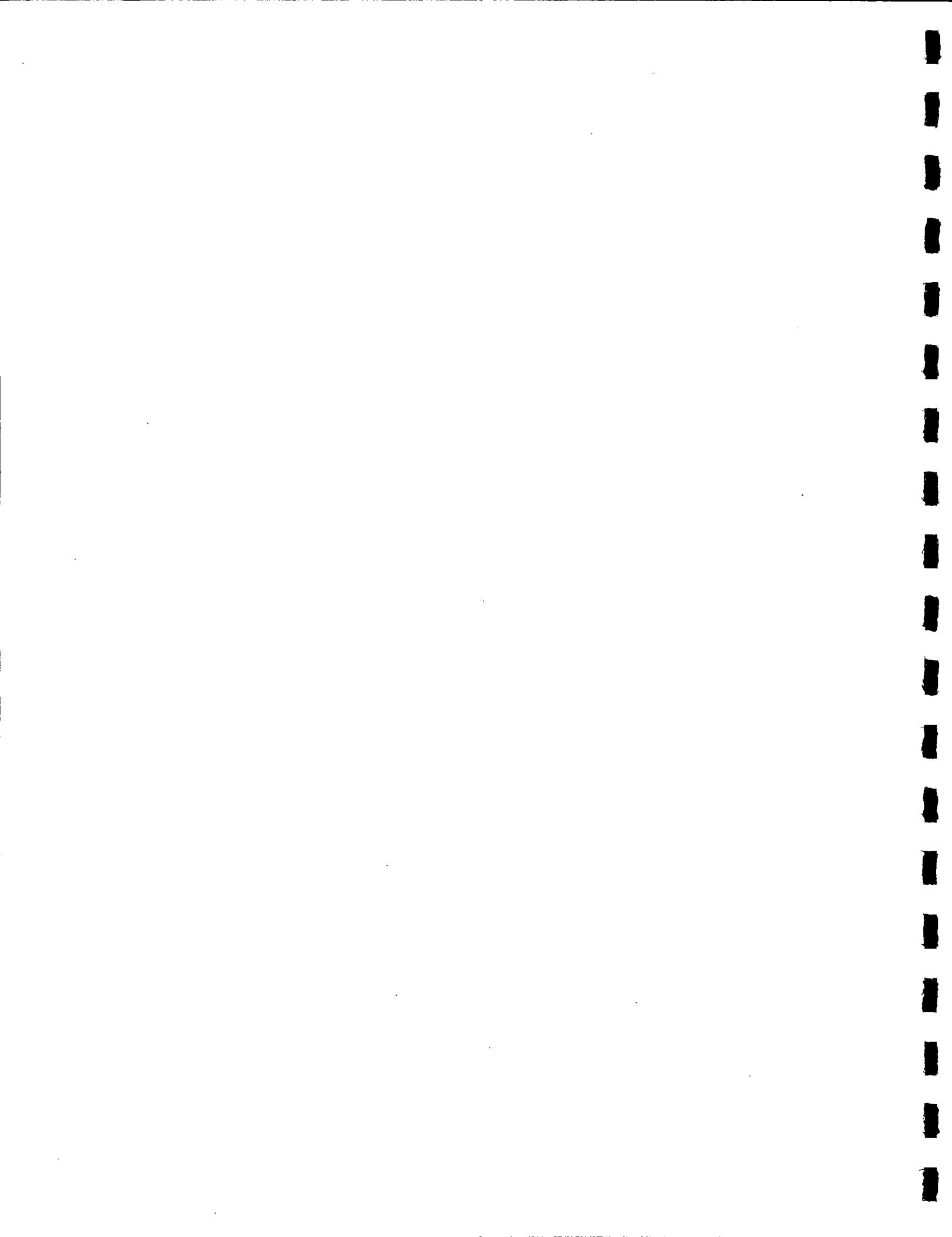
Contaminant trends examined

The sample size for this species is comprised of one egg from each of the two sites and therefore were not suitable for statistical analysis. These results should be regarded as baseline records from which future measures of contaminant levels can be compared.

Geographic variation in contaminant concentrations

Contaminant levels at the two sites were similar. The levels of PCB's at the Walpole Island site were marginally greater than Long Point eggs. Most contaminants at both colonies were found in low or trace amounts. A total of 15 residues (i.e. 50% of those measured) were detected.





Section 4.

Diets of Selected Colonial Fish-eating Birds of the Great Lakes

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the Great Lakes

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Abbreviations specific to Table 19.

a = abundant (food item had frequency of occurrence
>50% within the total sample)

c = common (food item had frequency of occurrence
between 10 and 50% within the total
sample)

u = uncommon (food item had frequency of occurrence
between 0.1 and 9% within the total
sample)

x = food item was present in the sample but percent
frequency of occurrence was not reported.

xx = sample type used in study

The lack of a letter or number accompanying the food item
indicates that the food item was NOT found in the sample.

LIST OF SCIENTIFIC NAMES SPECIFIC TO TABLE 19

Common fish names are listed in the alphabetical order (see name in bold) and all others are listed afterward in the order in which they appear on Table 19.

alewife	<u>Alosa pseudoharengus</u>
rock bass	<u>Ambloplites rupestris</u>
smallmouth bass	<u>Micropterus dolomieu</u>
bullhead	<u>Ictalurus nebulosus</u>
burbot	<u>Lota lota</u>
catfish sp.	<u>Ictalurus sp.</u>
lake northern chub	<u>Coursesius plumbeus</u>
johnny darter	<u>Etheostoma nigrum</u>
drum sp.	<u>Aplodinotus sp.</u>
freshwater drum	<u>Aplodinotus grunniens</u>
herring	<u>Coregonus sp.</u>
bluntnose minnow	<u>Pimephales notatus</u>
fathead minnow	<u>Pimephales promelas</u>
minnow sp.	<u>Notropis sp.</u>
trout perch	<u>Percopsis omiscomaycus</u>
yellow perch	<u>Perca flavescens</u>
northern pike	<u>Esox lucius</u>
pumpkinseed	<u>Lepomis gibbosus</u>
sculpin sp.	<u>Cottus sp.</u>
slimy sculpin	<u>Cottus cognatus</u>
spoonhead sculpin	<u>Cottus ricei</u>
emerald shiner	<u>Notropis atherinoides</u>
golden shiner	<u>Notemigonus crysoleucas</u>
spottail shiner	<u>Notropis hudsonius</u>
common shiner	<u>Notropis cornutus</u>
smelt	<u>Osmerus mordax</u>
ninespine stickleback	<u>Pungitius pungitius</u>
sucker sp.	<u>Catostomus sp.</u>
longnose sucker	<u>Catostomus catostomus</u>
lake trout	<u>Salvelinus namaycush</u>
common whitefish	<u>Coregonus clupeaformis</u>

frog	<u>Rana pipiens</u>
true bugs	Hemiptera
beetles	Coleoptera
butterflies	Lepidoptera
flies	Diptera
wasps, bees, ants	Hymenoptera
mayflies	Ephemeroptera
cicadas,	Homoptera
leafhoppers, scale insects	
spongilla	Neuroptera
flies	
peamouth	<u>Mylocheilus caurinus</u>
dragonflies	Odonata
caddisflies	Trichoptera
grasshoppers	Orthoptera

Table 19. Diets of selected fish-eating birds of the Great Lakes.

HERRING GULL

Study Site	Gull Island, L.Ontario	Scotch Bonnet Island, L.Ontario	Snake Island, L.Ontario	West Brother Island, L.Ontario
Study date	April-June 1977	April-June 1977	April-June 1977	April-June 1977

Percent Frequency of Occurrence in total sample

Food Item				
Total Fish	57.5	68	41.2	63.6
Total Mammal	15.5		48.1	
Total Bird	9.2	16.9	0.8	
Total Insect	36.8	36.1		56.7
Crustacean, Earthworm, and Plant material	7.5	15.2	7.8	6.0
Sample type				
-food pellets	xx	xx	xx	xx
Sample size (N)	174	722	524	187
Sample type				
-food pellets	xx	xx	xx	xx
Reference	Fox et al., 1990	Fox et al., 1990	Fox et al., 1990	Fox et al., 1990

HERRING GULL

Study Site	Lake Erie	Fighting Island, Detroit R.	Lake Huron	Georgian Bay
Study date	1979-81	Mar.-April 1978-81	Mar.-April 1980-81	Mar.-April 1980-81

Percent Frequency of Occurrence in total sample

Food Item				
Total Fish	76	73	5	5
Total Mammal	5		78	25
Total Bird	1	2	10	13
Total Invertebrate	1	5	2	4
Total Plant	16		1	4
Total Garbage		19	3	47
Sample type -food pellets	xx	xx	xx	xx
Sample Size (N)	231	85	167	135
Reference	Ewins, et al., (in press)	Ewins, et al., (in press)	Ewins, et al., (in press)	Ewins, et al., (in press)

HERRING GULL

Study Site	Hamilton Harbour, L. Ontario	Little Galloo Island, L. Ontario	Scotch Bonnet Island, L. Ontario	Niagara River,
Study date	1982, 1990-91	1982, 1990-91	1982, 1990-91	1982-83

Percent Frequency of Occurrence in total sample

Food Item				
Total Fish	60	94	98	50
Total Mammal	23	9	4	1
Total Bird	26	7	18	16
Total Invertebrate	7	3	5	30
Total Plant	57	38	21	15
Total Garbage	62	7	7	45
Sample type				
-food pellets	xx	xx	xx	xx
Sample size (N)	121	152	224	151
Reference	Ewins, et al., (in press)	Ewins, et al., (in press)	Ewins, et al., (in press)	Ewins, et al., (in press)

DOUBLE-CRESTED CORMORANT

Study Site	Gull Island, Lake Superior	Eagle Island, Lake Superior
Study year	1984	1984

Percent Frequency of Occurrence in Total Sample

Food Item		
Total Fish	99.6	99.1
-alewife		
-smelt	u	u
-yellow perch		
-ninespine stickleback	c	
-burbot	c	c
-slimy sculpin	c	c
-lake northern chub	c	u
-spoonhead sculpin	c	u
-sculpin sp.		
-trout perch	u	
-longnose sucker	u	u
-lake trout	u	u
-Menominee whitefish	u	u
-common whitefish	u	u
-herring	u	u
-sucker sp.		
Total Invertebrate	0.4	0.9
Sample type		
-food pellets	xx	xx
-regurgitations	xx	xx
Sample size (N)	150	150
Reference	Craven and Lev, 1987	Craven and Lev, 1987

CASPIAN TERN

Study Site	Pigeon Island, L.Ontario	South Limestone Island, Georgian Bay	Little George Island, Lake Winnipeg
Study date	1977	1980	1971

Percent Frequency of Occurrence in total sample

Food Item			
Total Fish	100	100	100
-alewife	a	x	
-smelt	u	x	
-yellow perch	c	x	
-smallmouth bass	u	x	
-golden shiner	u		
-pumpkinseed	u	x	
-rock bass	u	x	
-northern pike		x	
-ninespine stickleback		x	
-emerald shiner		x	
Total Bird			0.3
Total Insect			6.0
Eggshell			3.2
Sample type			
-food pellets	xx		xx
-adult to chick feeding observations		xx	
Sample size (N)	46		784
Reference	Allan, 1977	Quinn, 1980	Vermeer, 1973

COMMON TERN

Study Site	Little George Island, Lake Winnipeg	Leslie St. Spit, L.Ontario	Tower Island, Niagara R.
Study date	1971	1979	1979

Percent Frequency of Occurrence in total sample

Food Item			
Total Fish	35.4 *	100	100
-alewife		a	
-smelt		c	a
-trout perch			u
-emerald shiner		u	a
-spottail shiner		u	u
-common shiner		u	
-bluntnose minnow			c
-fathead minnow		u	
Total Insect	92.3		
Sample type			
-food pellets	xx		
-birds observed carrying food		xx	xx
-found on colony grounds		xx	xx
Sample size (N)	316	888	257
Reference	Vermeer, 1973	Courtney and Blokpoel, 1980	Courtney and Blokpoel, 1980

* = fish species occurring in sample were not identified.

BLACK-CROWNED NIGHT HERON

Study Site	Tommy Thompson Pk. L.Ontario	West Sister Island, L.Erie
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Study date	1988	1972
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Percent Frequency of Occurrence in total sample

Food Item

Total Fish	88.2	100
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-alewife	c	
-smelt		
-goldfish	u	
-white perch	u	
-pumpkinseed	u	
-johnny darter	u	
-minnow sp.		c
-catfish sp.		u
-herring sp.		c
-perch sp.		c
-drum sp.		

Total Mammal	3.9	
--------------	-----	--

Total Bird	19.1	
------------	------	--

Total Amphibia	0.6	
-frog	u	

Total Crustacea	7.9	
-crayfish	u	

Total Mollusc	0.9	
-snail	u	

Total Insect	17.6	36.8
--------------	------	------

Sample type		
-food pellets	xx	
-regurgitations	xx	
-gizzard contents	xx	
-stomach contents		xx

Sample size (N)	330	19
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Reference	Burgess et al.	Hoffman, 1978 (unpublished)
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RING-BILLED GULL

Study Site

Gull
Island,
L.Ontario
April 1977

Study date

Compilation of data
from three study sites:
Isle aux Galets, Bird Island,
and Rogers City, Lake Michigan
1971

Percent Frequency of Occurrence in total sample

Food Item

Total Fish	55	62.2
-alewife	a	x
-smelt	c	
-yellow perch	u	x
-pumpkinseed	u	
-rock bass	u	x
-stickleback		x
-minnow sp.		x
Total Bird	10	
Total Amphibia	20	
Total Crustacea	20	1.2
Total Mollusca	20	
Total Annelida		5.2
Total Insect	10	64
-true bugs	u	
-cicadas,	u	c
leafhoppers		
scale insects		
-beetles	u	
-caddisflies	u	u
-butterflies	u	c
-flies	u	c
-wasps, bees,	u	c
ants		
-mayflies	u	u
-dragonflies		u
-grasshoppers		u
-spongilla flies		u
Total Plant	20	
Sample type		
-food pellets	xx	
-regurgitations		xx
Sample size (N)	38	232
Reference	Allan, 1977	Jarvis and Southern, 1976

FORSTER'S TERN

Study Site Delta,
 Manitoba Pk., Lake Manitoba

Study date 1971

Percent Frequency of Occurrence in total sample

Food Item

Total Fish a
-pumpkinseed x
-peamouth x
-fathead x
minnow

Total Amphibia x
-frog x

Total Crustacea x
-crayfish x

Total Insect x
-dragonflies x
-caddisflies x
-grasshoppers x

Sample type
-summary of food items in diet from published reports

Sample size (N) -

Reference McNicholl,
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