

ASSESSMENT OF HISTORICAL PHYTOPLANKTON CHARACTERISTICS AND  
BLOOM PHENOMENA IN THE NEW YORK HARBOR ESTUARINE  
AND NEW YORK BIGHT ECOSYSTEMS

**Final Report**  
July 25, 1996

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APPENDIX A1

HARBOR SURVEY FOR 1986-1995

## **Harbor Survey Station Descriptions**

### **EAST RIVER**

- E-1 In line with pier 10, Manhattan and Brooklyn
- E-2 East 23 St.
- E-2A Newtown Creek Channel, north of Franklin St.
- E-3 East 42 St.
- E-4 Hell Gate, under Railroad Bridge
- E-5 Barretto Point, near Riker's Island
- E-6 Flushing Bay, west of old College Point ferry slip
- E-7 Whitestone Point
- E-8 Throgs Neck, midway between the two forts.
- E-13 Westchester Creek Channel
- E-14 Bronx River Channel
- E-15 South Flushing Bay, SEE of jetty

### **WESTERN LONG ISLAND SOUND**

- E-9 Stepping Stones Lighthouse
- E-10 South tip of Hart Island
- E-11 Little Neck Bay
- E-12 Eastchester Bay Channel

### **HARLEM RIVER**

- H-1 Spuyten Duyvil Creek, east of Railroad bridge
- H-2 Morris Heights, opposite ConEd Power Station

- H-3 155 St, near center pier of the drawbridge
- H-4 Willis Avenue, near center pier of the drawbridge
- H-5 East 106 St.

**NORTH RIVER**

- N-1 Mount Saint Vincent Academy
- N-2 Railroad Bridge over Spuyten Duyvill Creek
- N-3 West 155 St.
- N-3B West 125 St.
- N-3A West 72 St.
- N-4 West 42 St.
- N-5 The Battery, near Pier A

**HUDSON RIVER ESTUARY**

- N-6 Gong Buoy No. 27
- N-7 SE of Robbin's Reef Light
- G-1 Gowanus Bay, south of Erie Basin
- G-2 Gowanus Channel, west of Gowanus Canal
- N-8 Midspan under the Verrazano-Narrows Bridge
- N-9 Steeplechase Pier at Coney Island
- N-16 0.8 miles south of Rockaway Point
- K-5A Raritan River, northeast of Middlesex County Outfall
- K-6 Old Orchard Light, in line with beacon at Old Orchard Shoal

## **KILL VAN KULL**

- K-1 B & O Railroad coal dock, New Brighton
- K-2 Shooters Island, near old ferry slip pilings

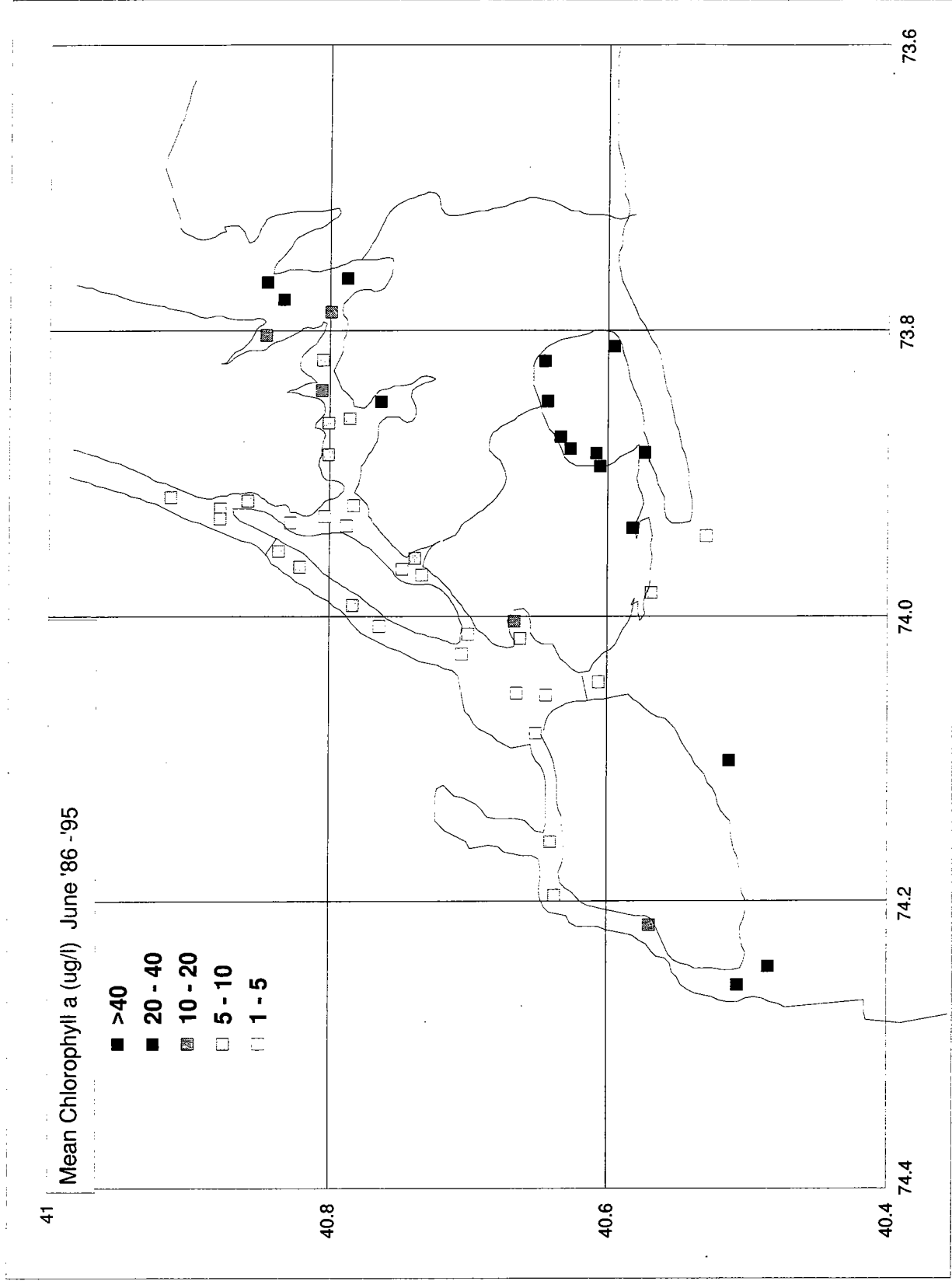
## **ARTHUR KILL**

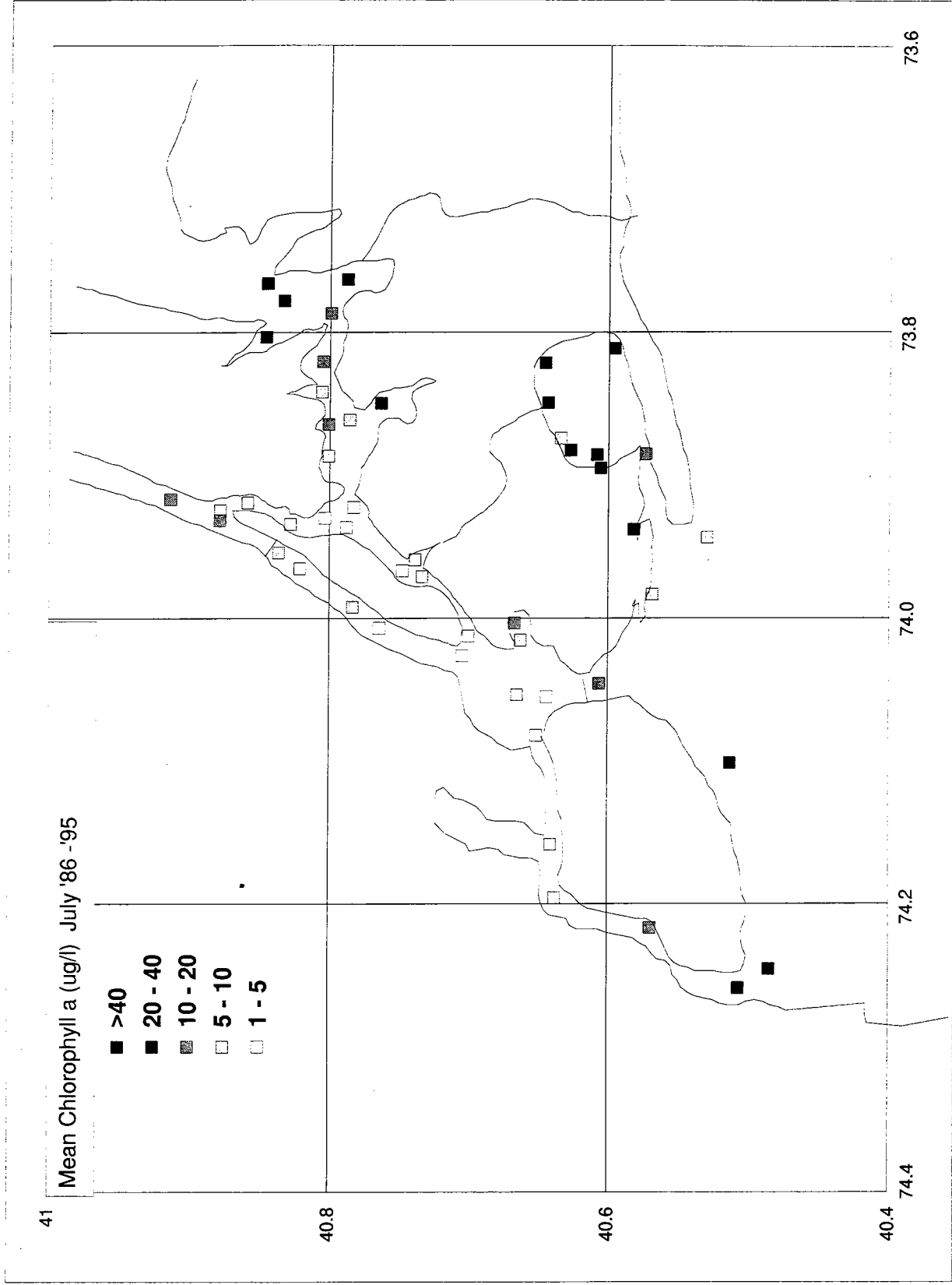
- K-3 Under B & O Railroad Bridge
- K-4 Fresh Kills opposite U.S. Metals Refining dock
- K-5 Tottenville ferry slip at Perth Amboy

## **JAMAICA BAY**

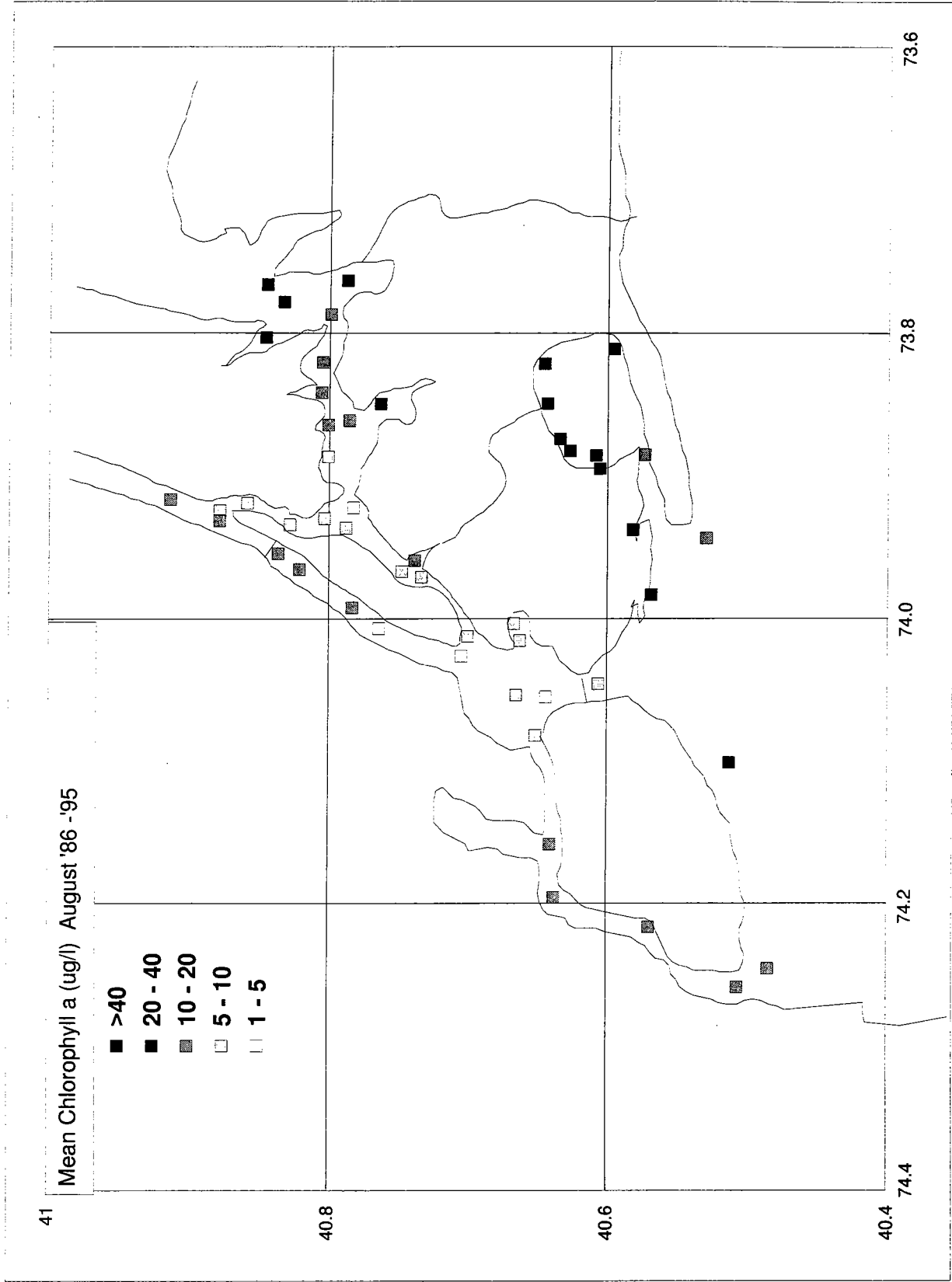
- J-1 Rockaway Inlet, center of Barren Island bridge
- J-2 Mill Basin
- J-3 South of Canarsie Pier
- J-5 Center pier of railroad trestle over Beach Channel
- J-7 Mouth of Bergen Basin, southeast of sludge storage tanks
- J-8 Spring Creek, east side of mouth of Old Mill Creek
- J-9 Fresh Creek, in channel
- J-10 Paerdegat Basin, southeast of bridge
- J-11 Sheepshead Bay

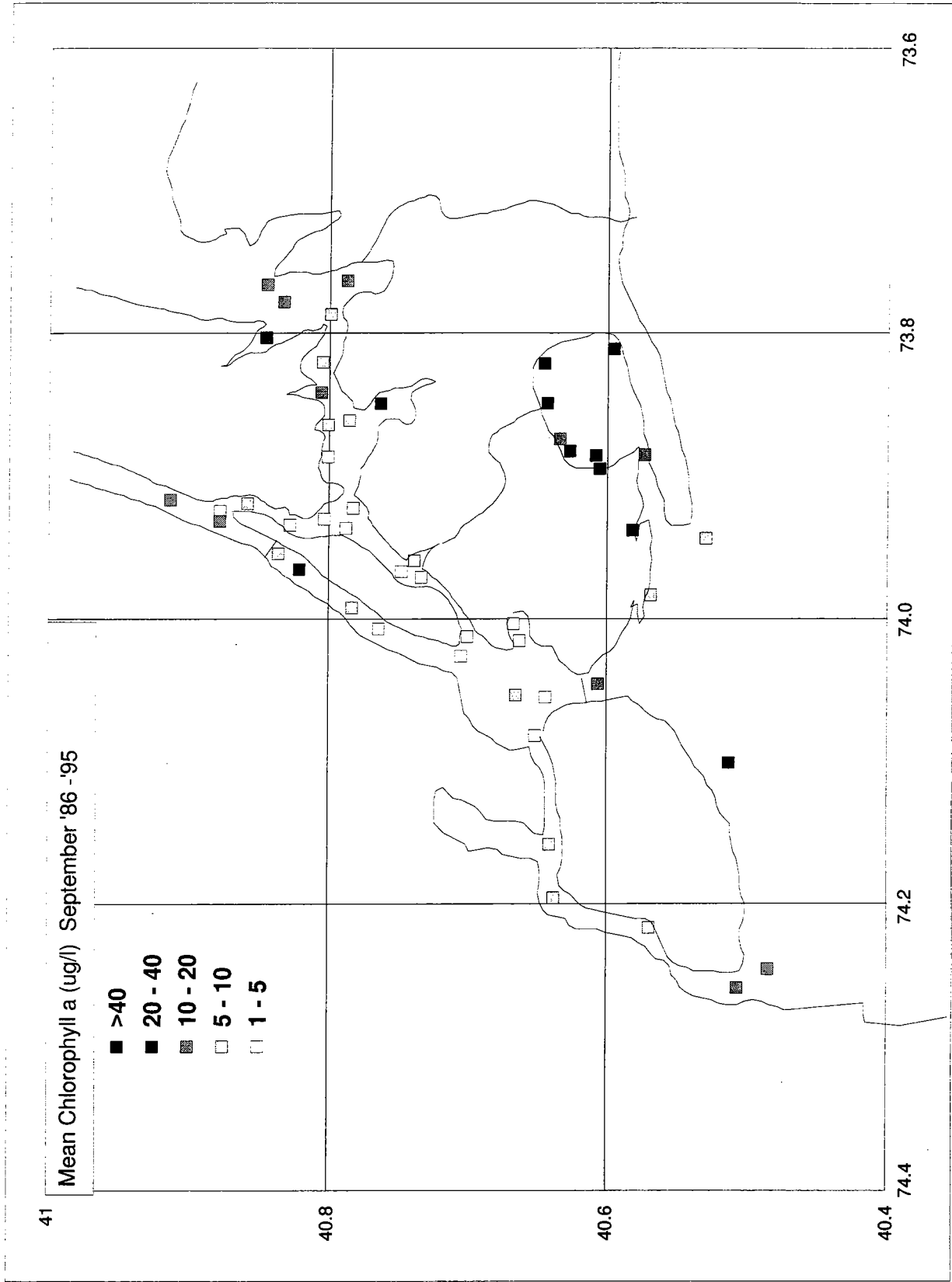
	June	July	August	September
E1	2.83	2.85	5.18	2.04
E2	1.72	5.04	6.00	1.89
E2A	5.01	8.66	10.73	9.36
E3	2.73	3.14	5.54	2.73
E4	3.69	3.45	4.25	2.94
E5	5.71	7.92	6.93	4.39
E6	7.41	9.95	13.43	5.60
E7	9.09	17.14	14.31	6.78
E8	16.92	17.52	16.23	9.82
E9	24.97	29.03	23.10	11.54
E10	28.05	28.76	26.97	14.34
E11	23.44	20.86	23.91	14.65
E12	14.83	29.60	32.83	20.19
E13	11.86	9.59	14.49	11.81
E14	9.45	12.95	13.38	9.97
E15	20.22	37.14	48.97	24.76
G1	6.73	8.21	7.24	3.99
G2	12.01	14.09	7.95	4.29
H1	6.60	6.93	8.39	4.57
H2	6.13	7.83	5.84	5.01
H3	4.58	5.99	6.02	3.83
H4	2.02	3.88	6.08	2.68
H5	4.88	3.89	8.28	2.94
J1	35.93	15.30	16.76	18.56
J2	45.23	31.53	27.66	30.83
J3	45.28	30.40	28.57	32.74
J5	44.42	20.94	23.51	25.63
J7	56.48	45.57	29.83	31.94
J8	51.93	35.10	26.51	29.19
J9	20.33	8.50	23.29	13.00
J10	48.61	31.60	24.28	25.93
J11	33.18	24.71	21.03	24.69
K1	4.83	3.92	7.30	4.26
K2	5.36	6.06	10.66	7.58
K3	5.35	5.46	10.43	6.39
K4	10.76	10.94	11.36	8.07
K5	26.62	22.58	16.36	16.50
K5A	22.78	27.49	19.72	11.82
K6	31.36	33.58	29.88	25.35
N1	9.39	12.56	16.98	10.31
N2	8.58	11.30	16.68	10.27
N3	7.93	8.66	16.13	5.53
N3A	7.80	8.89	13.35	21.90
I3B	6.70	9.12	13.97	9.37











APPENDIX A2

ISSC FOR 1975-1986

## **Interstate Sanitation Commission**

### **EAST RIVER**

- ER-1 Mid-channel under Manhattan Bridge
- ER-2 Mid-channel under Williamsburg Bridge
- ER-3 Pier #73, Manhattan and Greene St, Brooklyn
- ER-4 East Channel under Queensboro Bridge
- ER-9 Bell Beacon on Wards Island and ConEd, Astoria
- ER-11 College Point Beacon and stack on Rikers Island

### **WESTERN LONG ISLAND SOUND**

- ER-15 Middle of Throgs Neck Bridge; aka LI-15
- ER-17 500 yds off Stepping Stones; aka LI-17
- ER-19 Off Bell #27 at Gang Way Rock; aka LI-19

### **HARLEM RIVER**

- HA-1 Third Bridge after Triboro Bridge
- HA-2 Hamilton Bridge

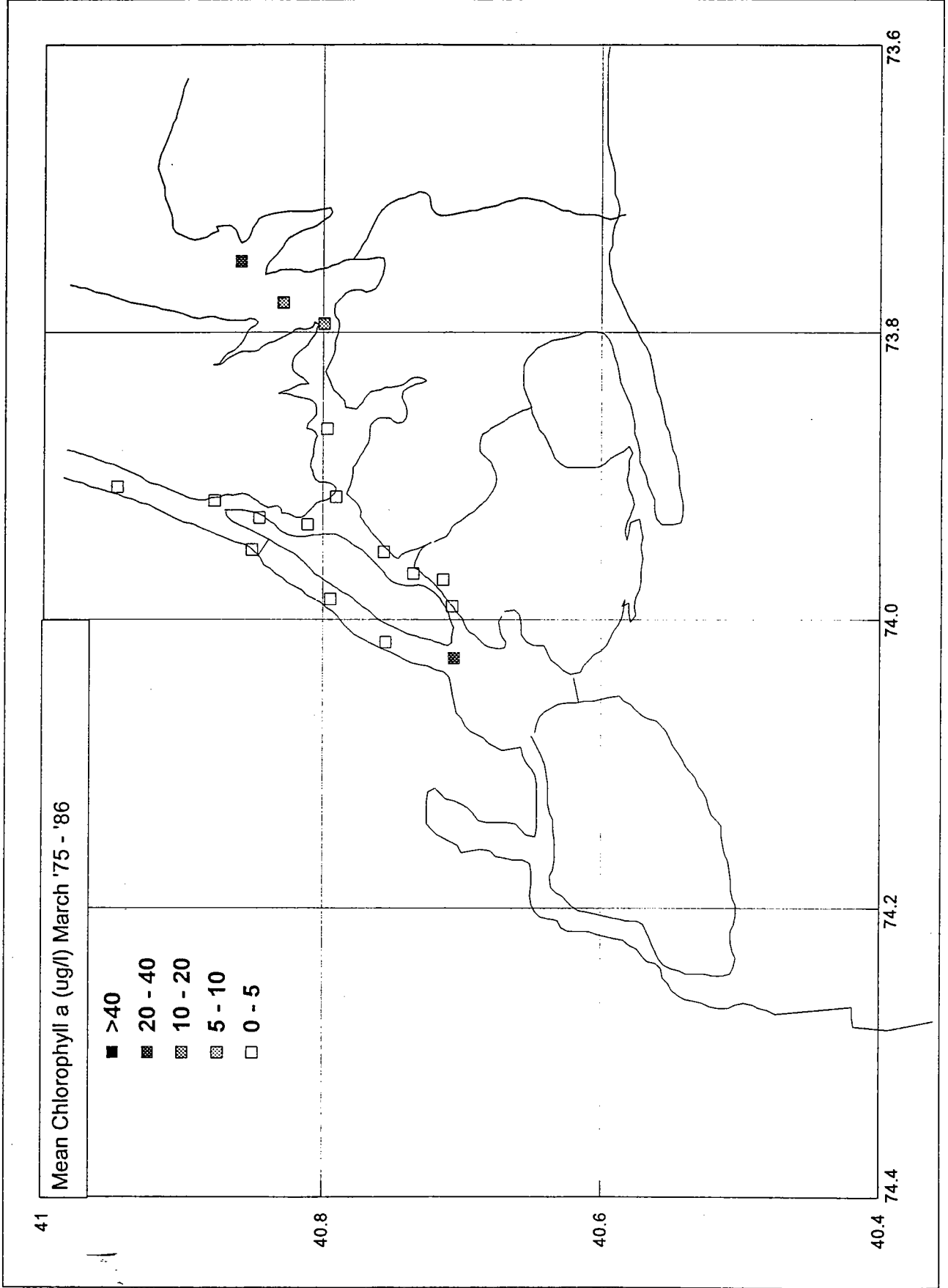
### **NORTH RIVER**

- HR-7 Opposite Phelps Dodge, Yonkers
- HR-5 Spuyten Duyvill Creek, under Henry Hudson Bridge
- HR-4 Under George Washington Bridge
- HR-3 Soldiers & Sailors Monument, NY and Circular apartment buildings, NJ
- HR-2 Heliport, NY and Seatrain Pier, NJ
- HR-1 Fire boat pier, NY and Railroad pier, NJ

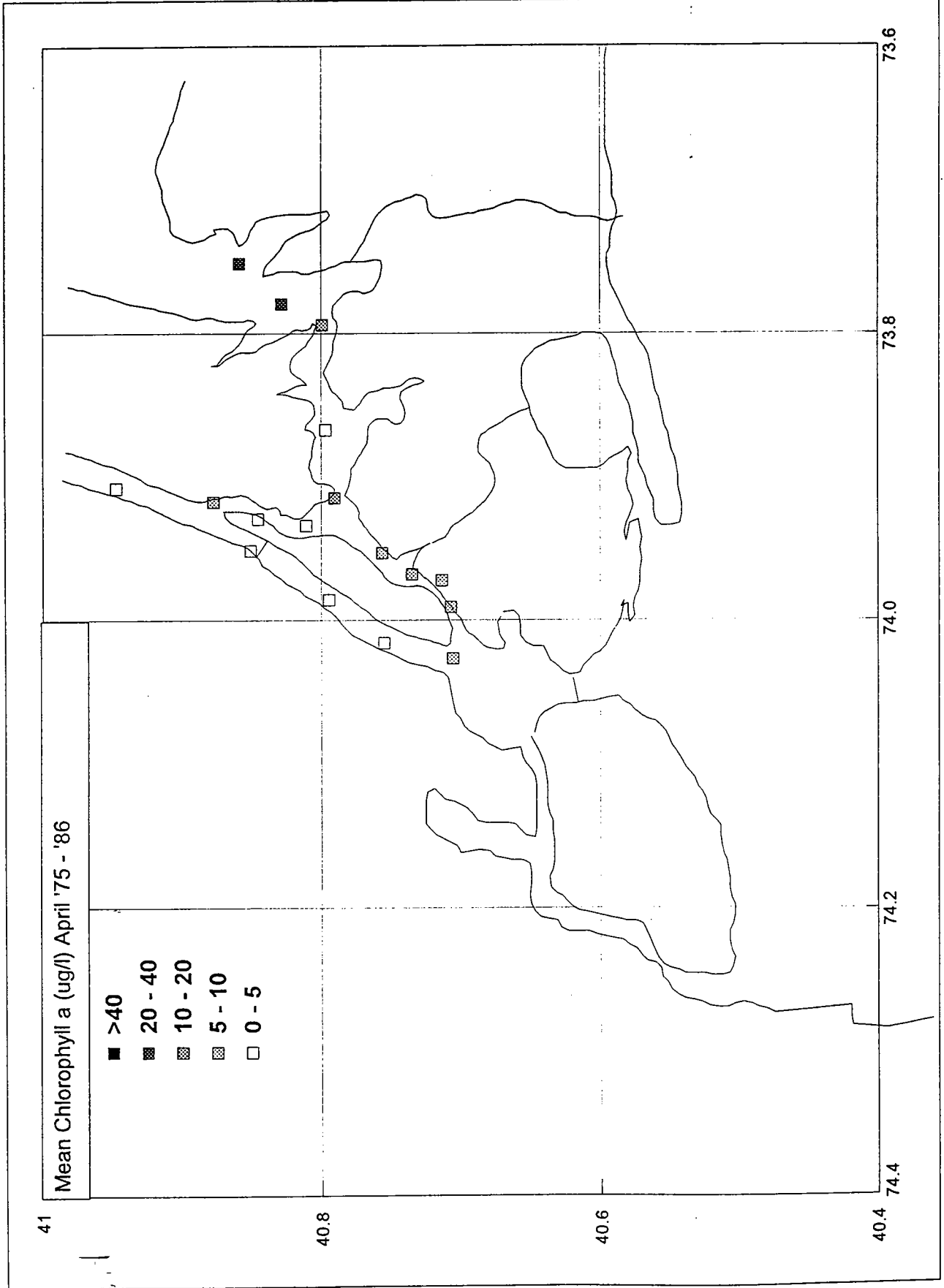
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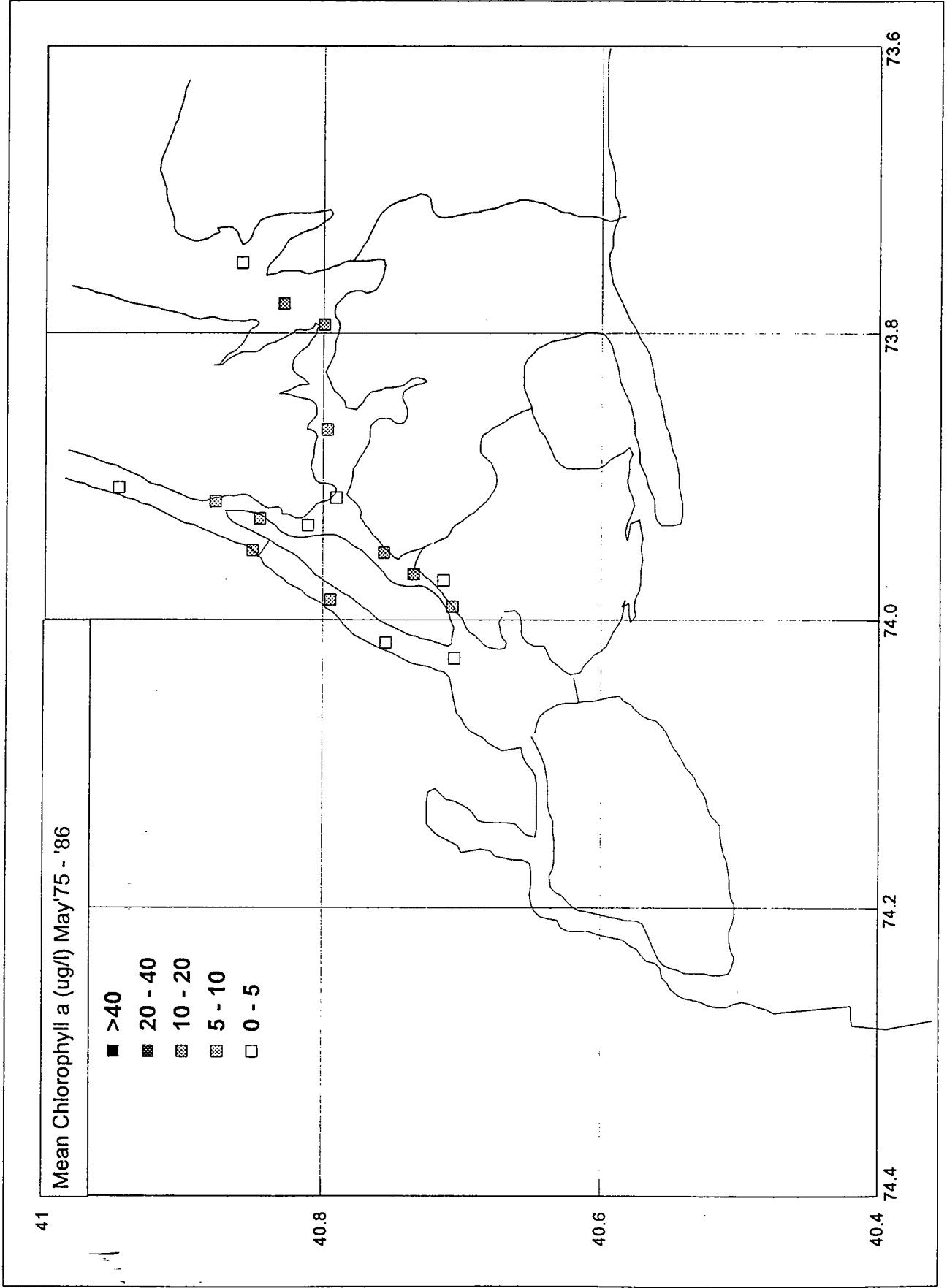
	1	2	3	4	5	6	7	8	9	10	11	12
ER-01				5.00	8.50		6.25	1.00	8.50			
ER-02				6.00	2.50		3.71	3.33	2.50			
ER-03				9.00	10.00		5.20	1.67	5.00			
ER-04				5.50	12.00		5.00	3.50				
ER-09				15.50	1.00		5.67	3.33	8.33			
ER-11					7.00		6.50	8.00	8.33			
ER-15			11.50	16.50	19.33	41.00	17.70	16.00	14.60	8.50	3.00	2.00
ER-17			13.00	24.00	14.50	24.50	24.44	15.17	15.00	11.00	6.50	
ER-19			31.50	27.00	4.00	54.00	19.20	15.17	17.17	9.00	5.00	4.00
HA-01				4.50	1.00		6.25	12.00	3.00			
HA-02				3.50	7.00		6.83	2.00	6.00			
HR-03				3.50	6.00		5.71	8.17	7.25			
HR-1			37.00	5.25	4.50	5.00	6.50	4.50	6.75	9.00	5.00	
HR-2		3.00		3.00	5.00		5.63	2.80	4.17			
HR-4				2.00	6.50		6.44	13.40	7.17			
HR-5				5.00	5.50		5.71	5.67	2.00			
HR-7							4.75	7.00	4.50			
HR-9								13.00				
HR-12								14.00				
HR-16								11.00				
HR-20								10.00				

Interstate Sanitation Commission

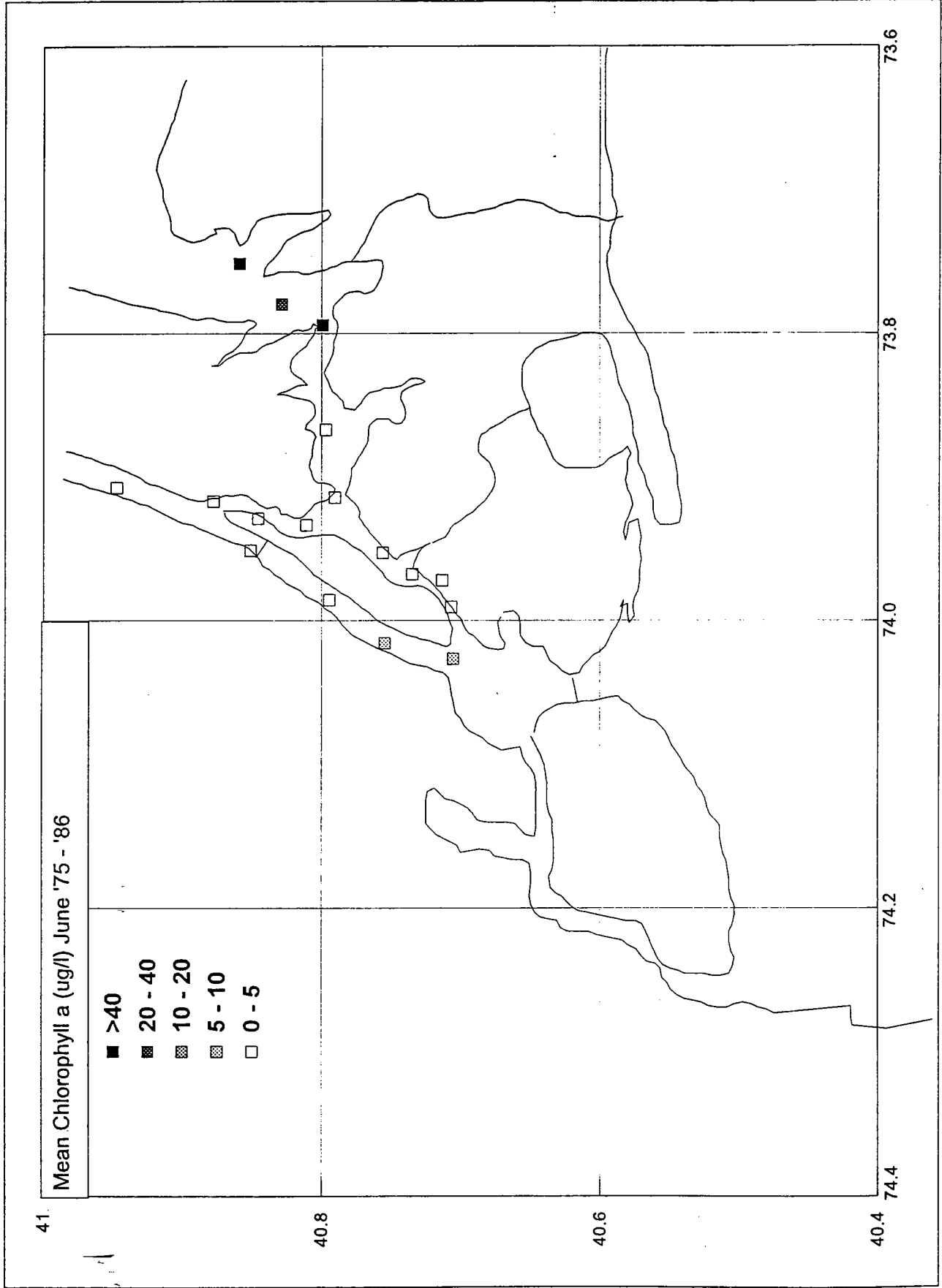


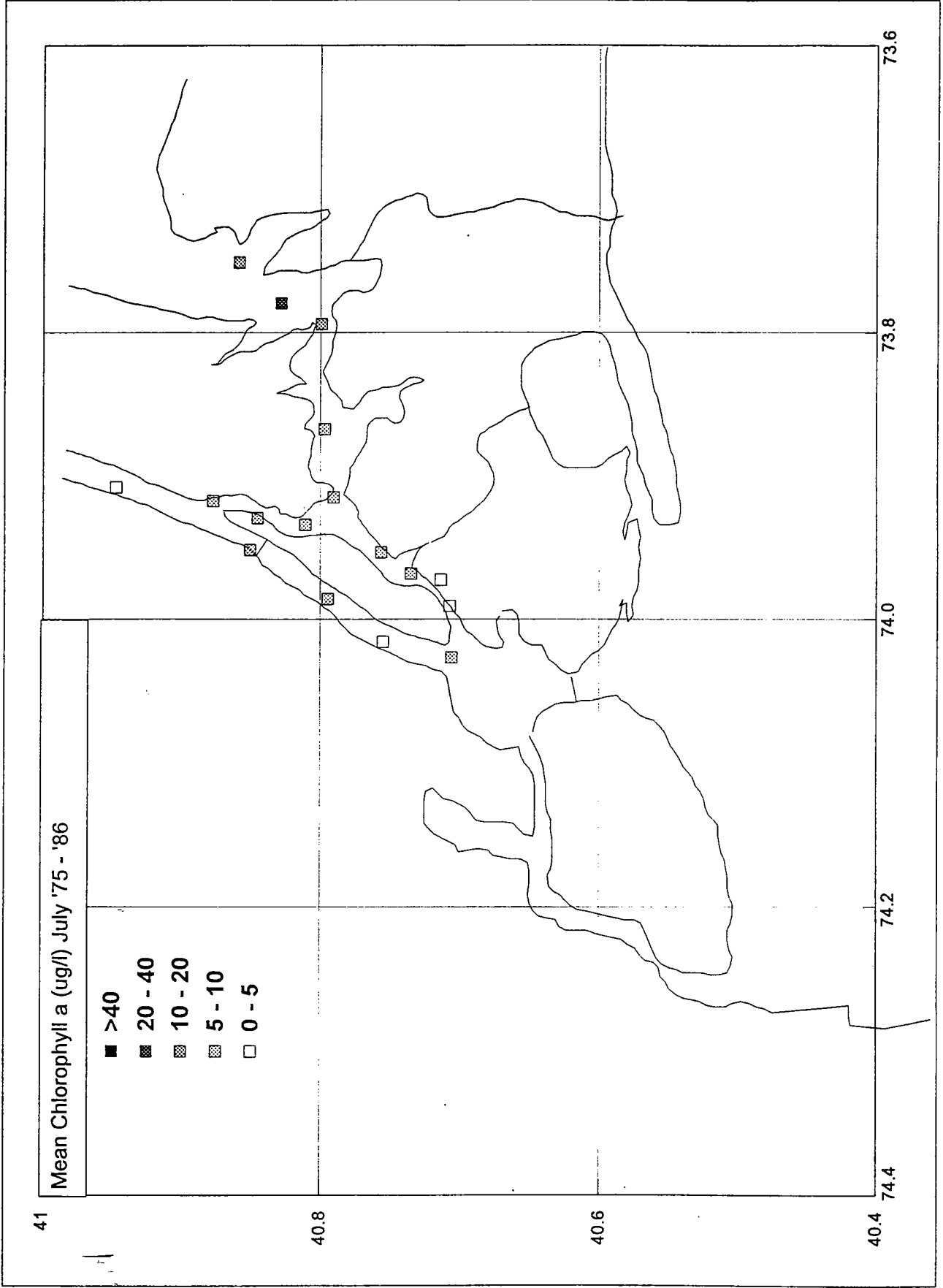
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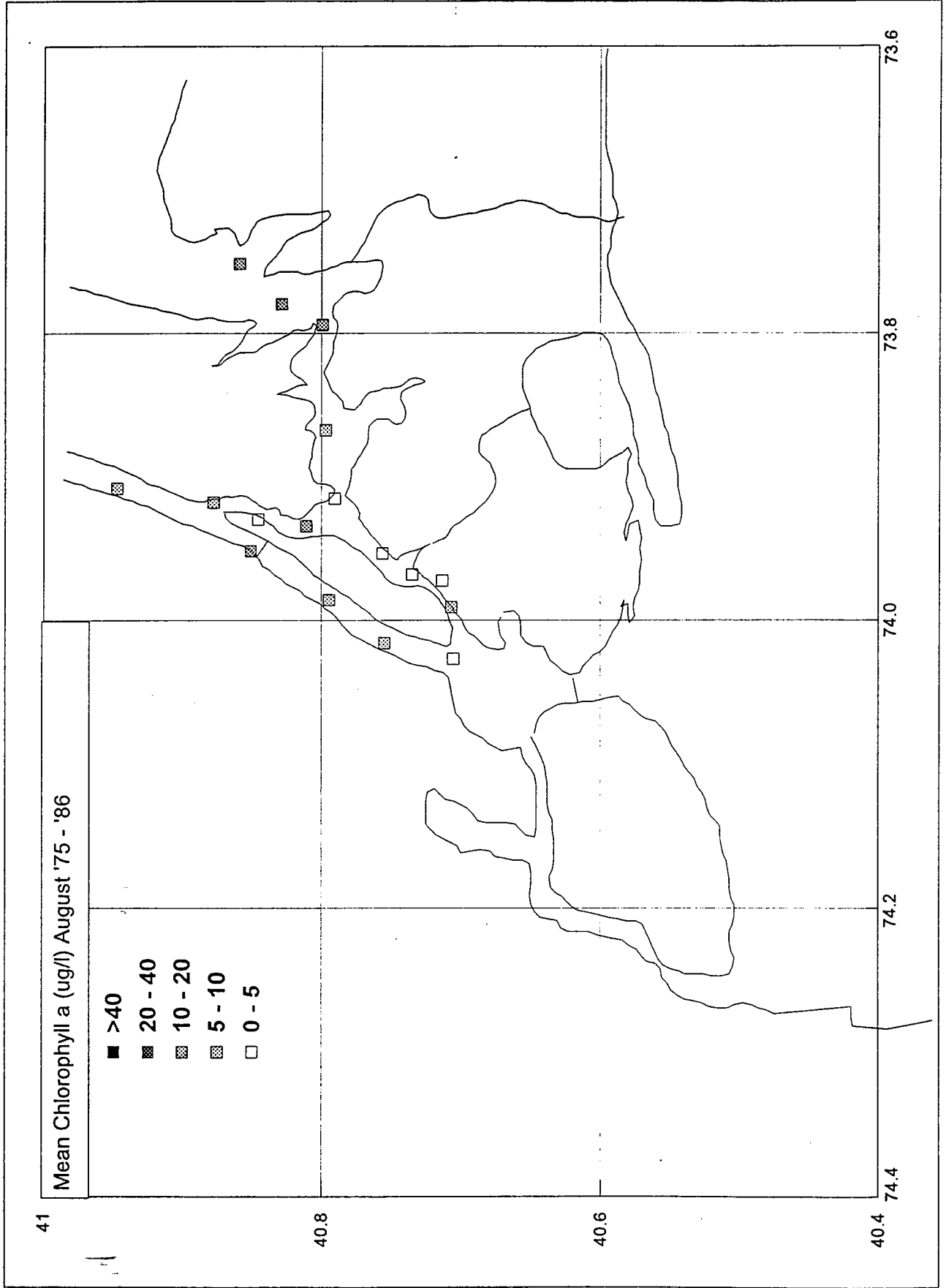


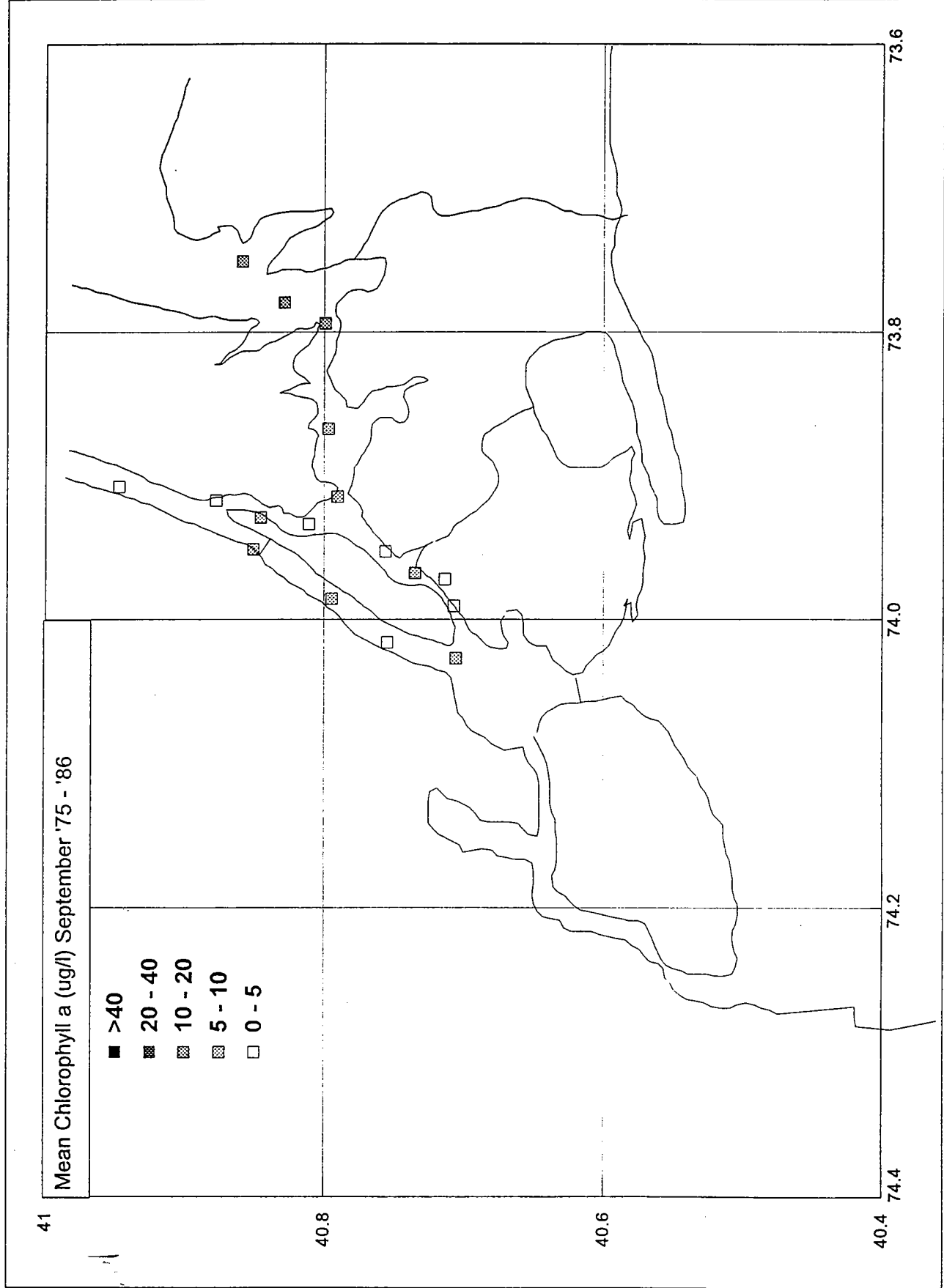




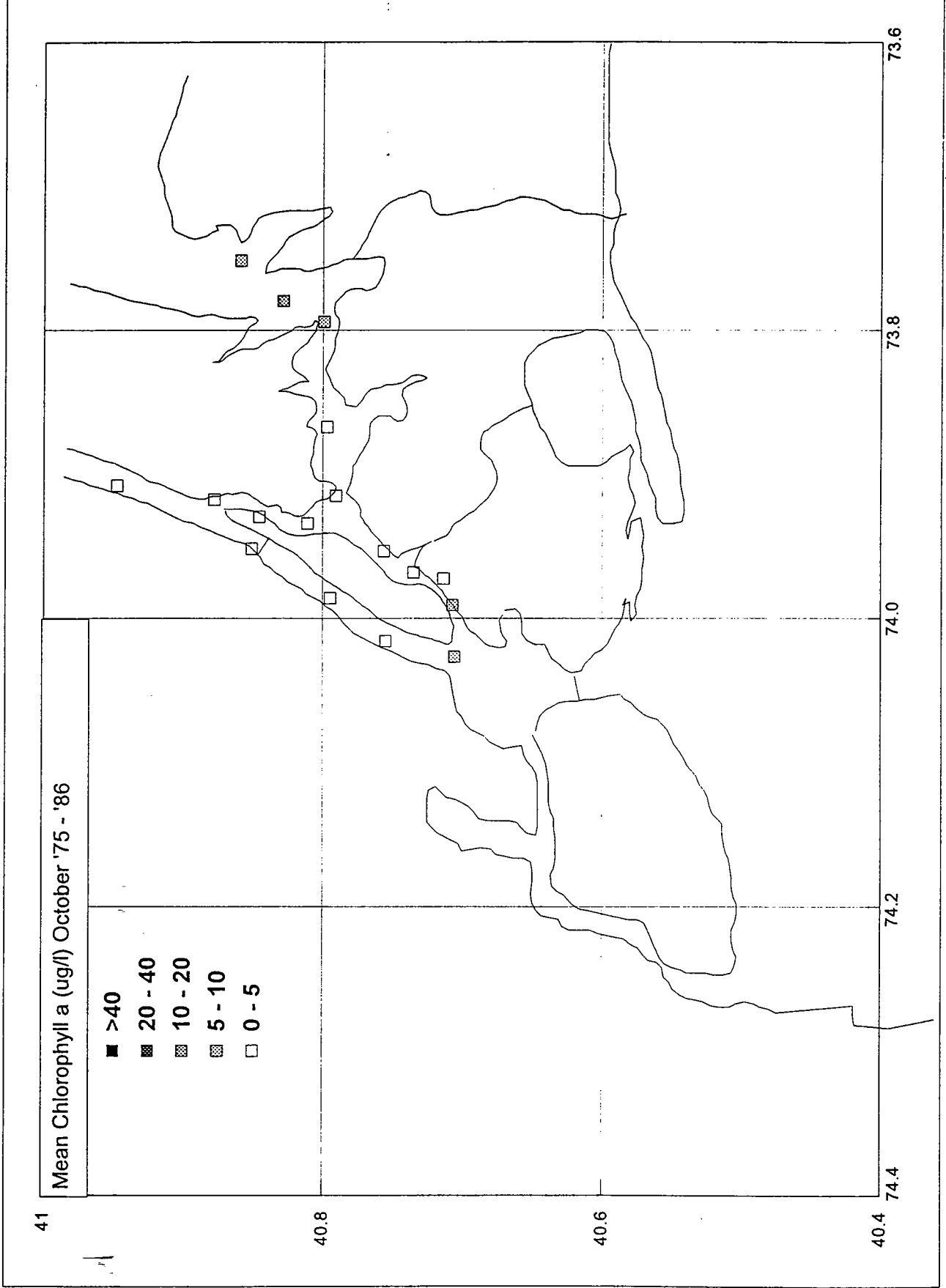


Interstate Sanitation Commission

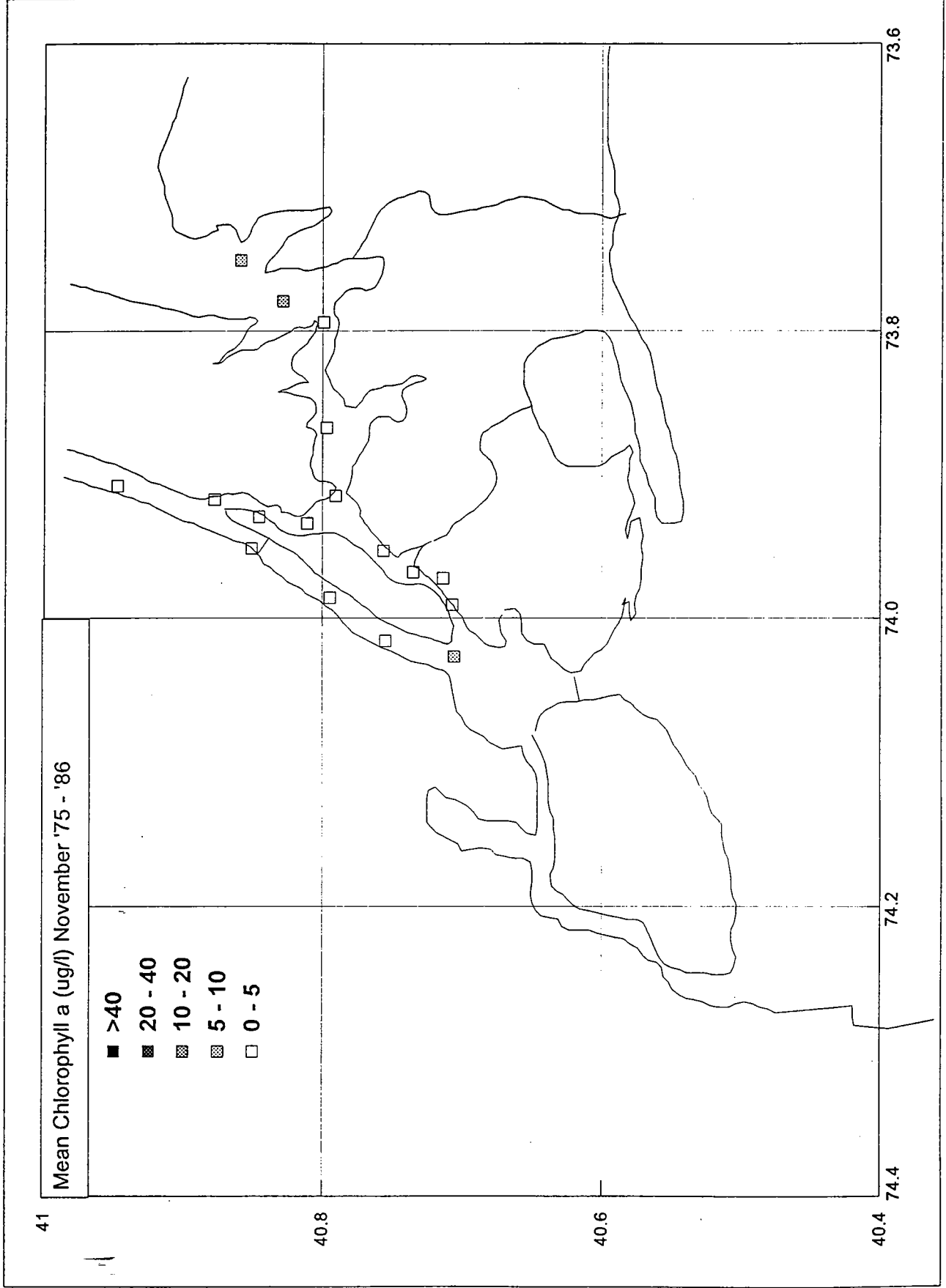




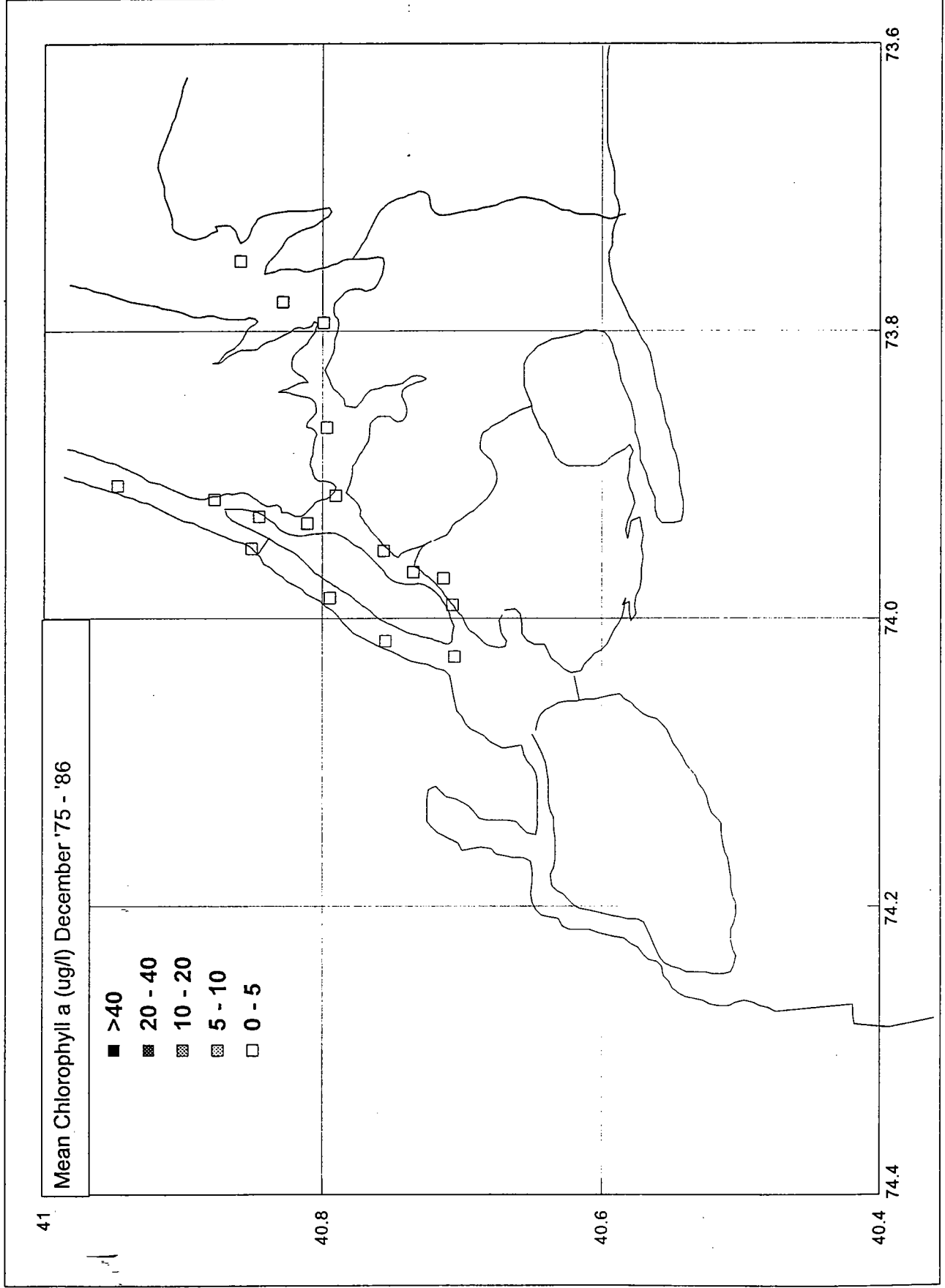
Interstate Sanitation Commission



Interstate Sanitation Commission



Interstate Sanitation Commission



APPENDIX A3

NJDEP 1988-1995



## N.J. EPA Sites

### Jersey Coast

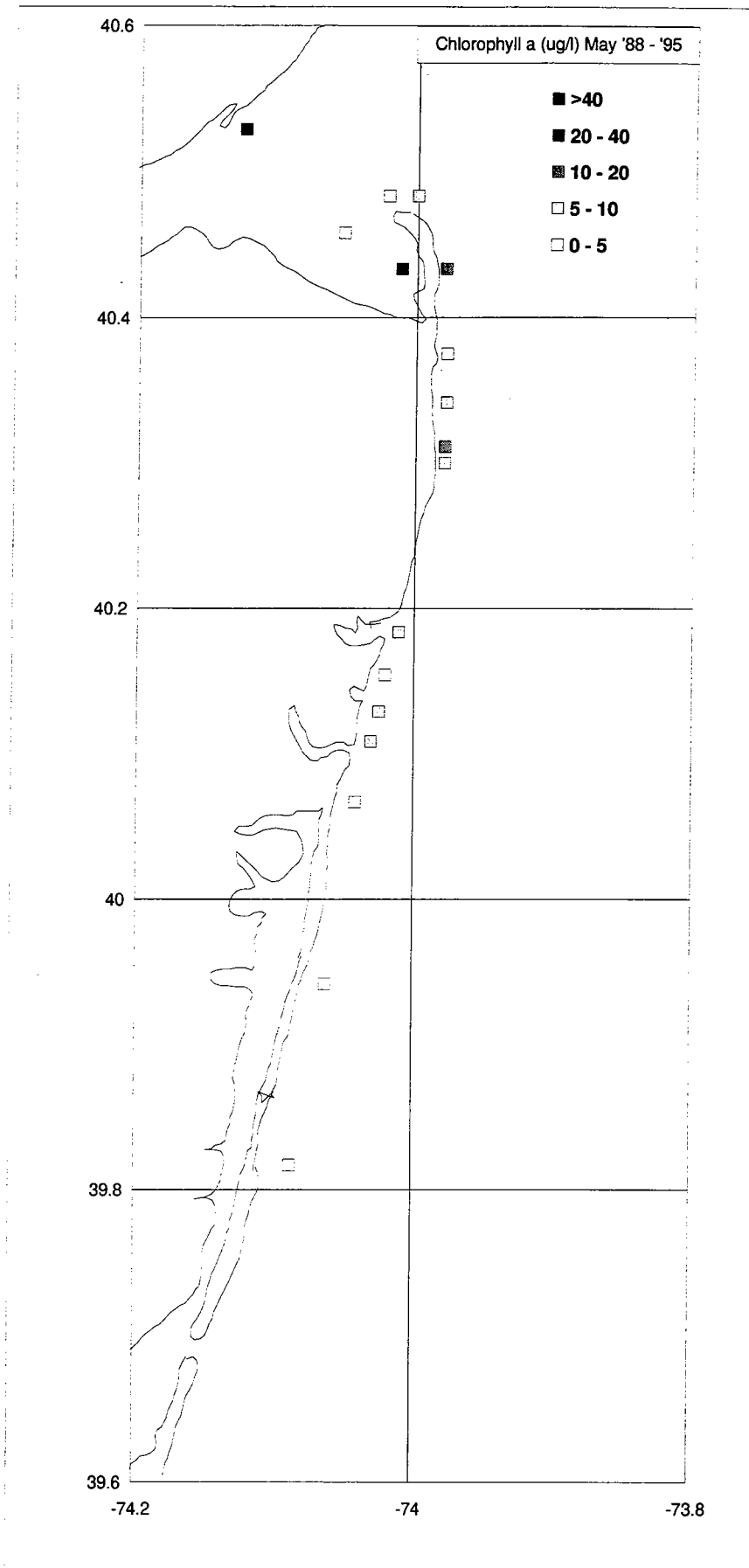
JC01A	74,00,00;40,29,00	Sandy Hook, 1.2 km south of tip
JC03	73,58,45;40,26,00	Sandy Hook, off Nature Center building
JC08	73,56,40;40,22,30	Sea Bright, at public beach
JC11	73,56,40;40,20,30	Monmouth Beach Bath & Tennis Club
JC13	73,58,45;40,18,40	Long Branch, Chelsea Avenue
JC14	73,58,45;40,18,00	Long Branch, foot of S. Bath Avenue
JC26	74,00,40;40,11,00	Shark River Inlet
JC30	74,01,15;40,09,00	Spring Lake
JC33	74,01,30;40,07,45	Sea Girt, foot of Chicogo Avenue
JC35	74,01,50;40,06,15	North side of Manasquan Inlet
JC41	74,02,30;40,04,00	Bay Head, foot of Johnson Street
JC53	74,03,45;39,56,30	Seaside Heights, amusement piers
JC57	74,05,15;39,49,00	Island Beach State Park, between main parking lots

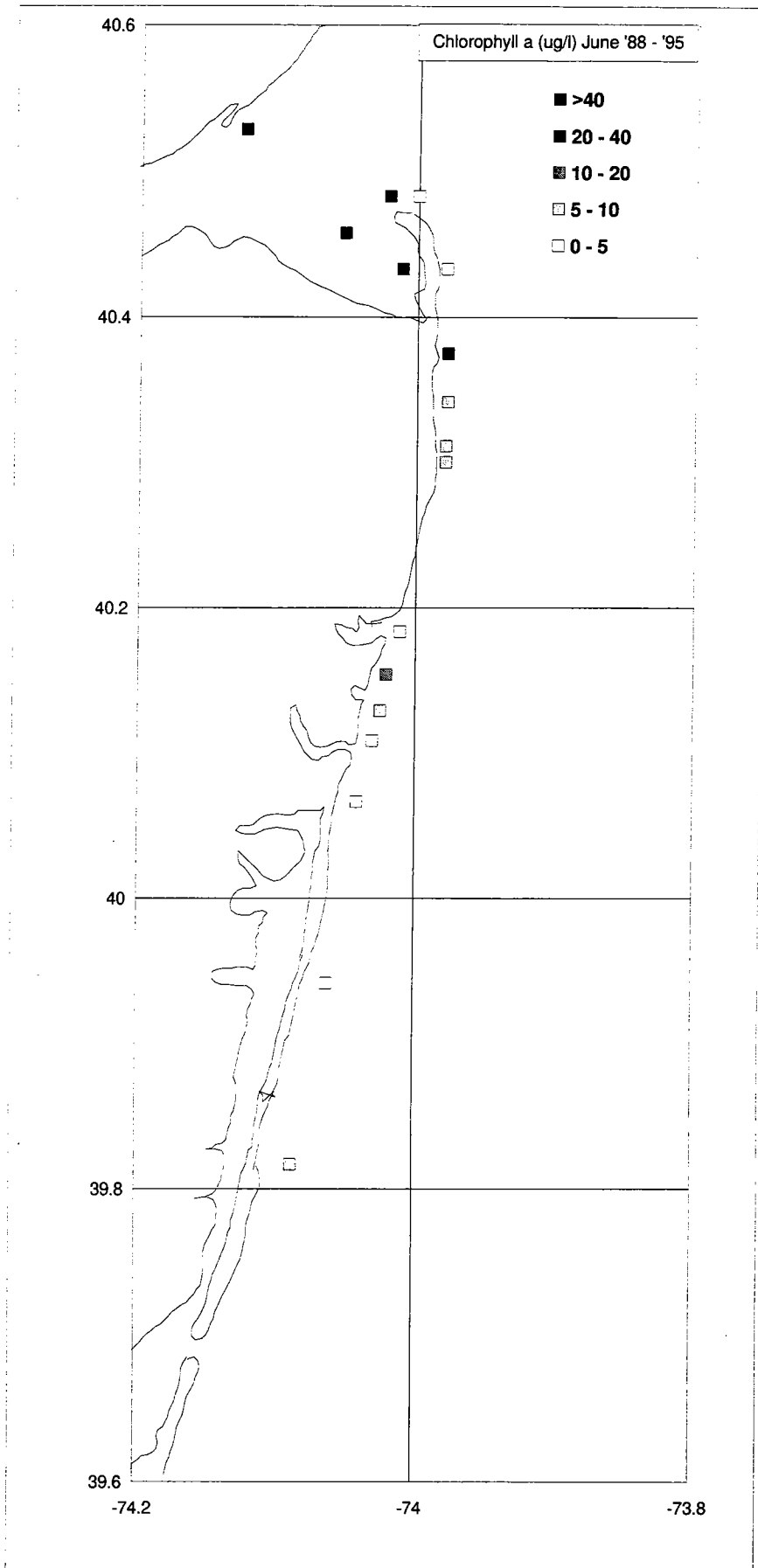
### Raritan Bay

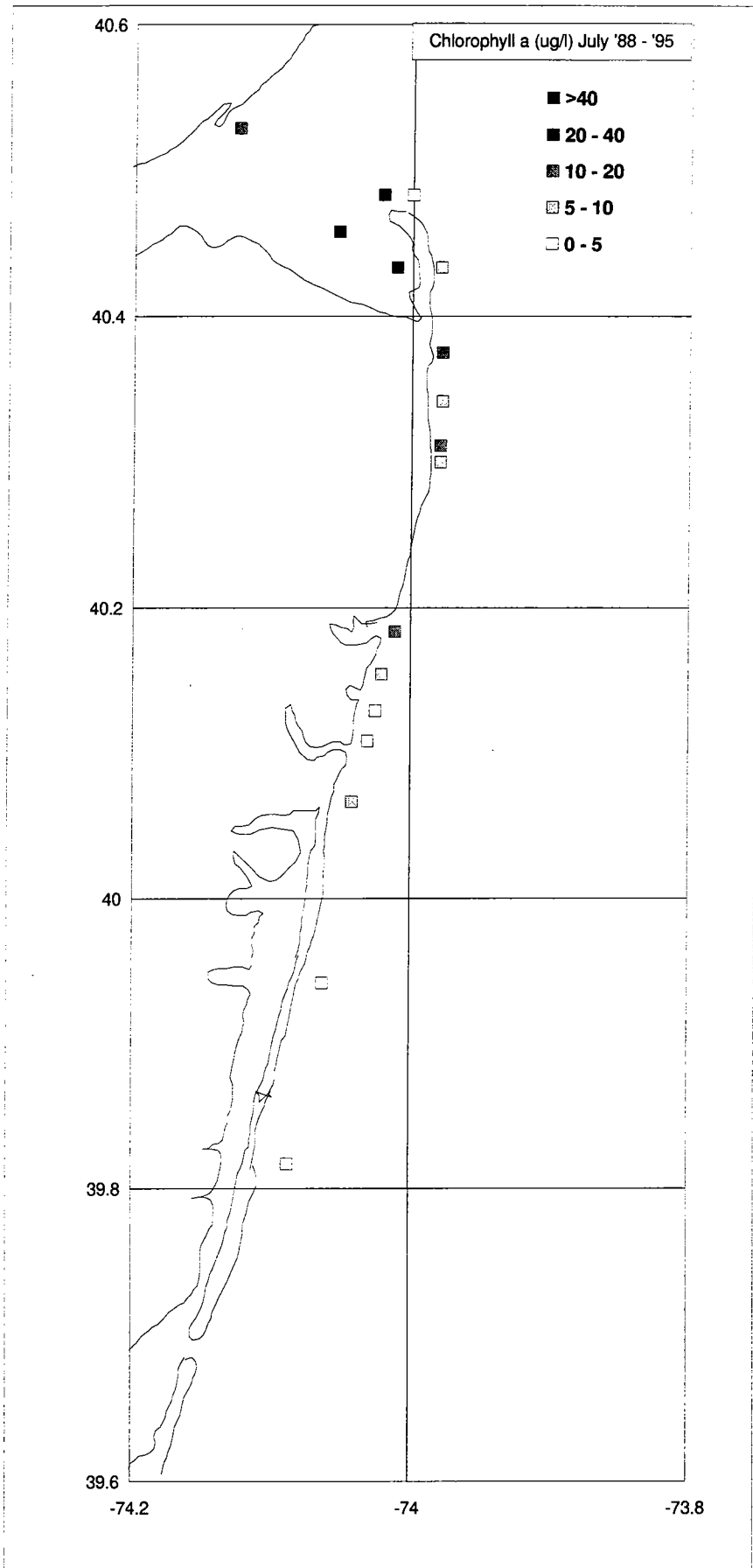
RB15	74,00,40;40,26,00	Sandy Hook Bay, 5 km south of tip
RB24	74,01,15;40,29,00	Sandy Hook, west of tip
RB51A	74,03,10;40,27,30	Sandy Hook Bay 4 km N of foot of Normandy Rd
RB57	74,07,30;40,31,45	

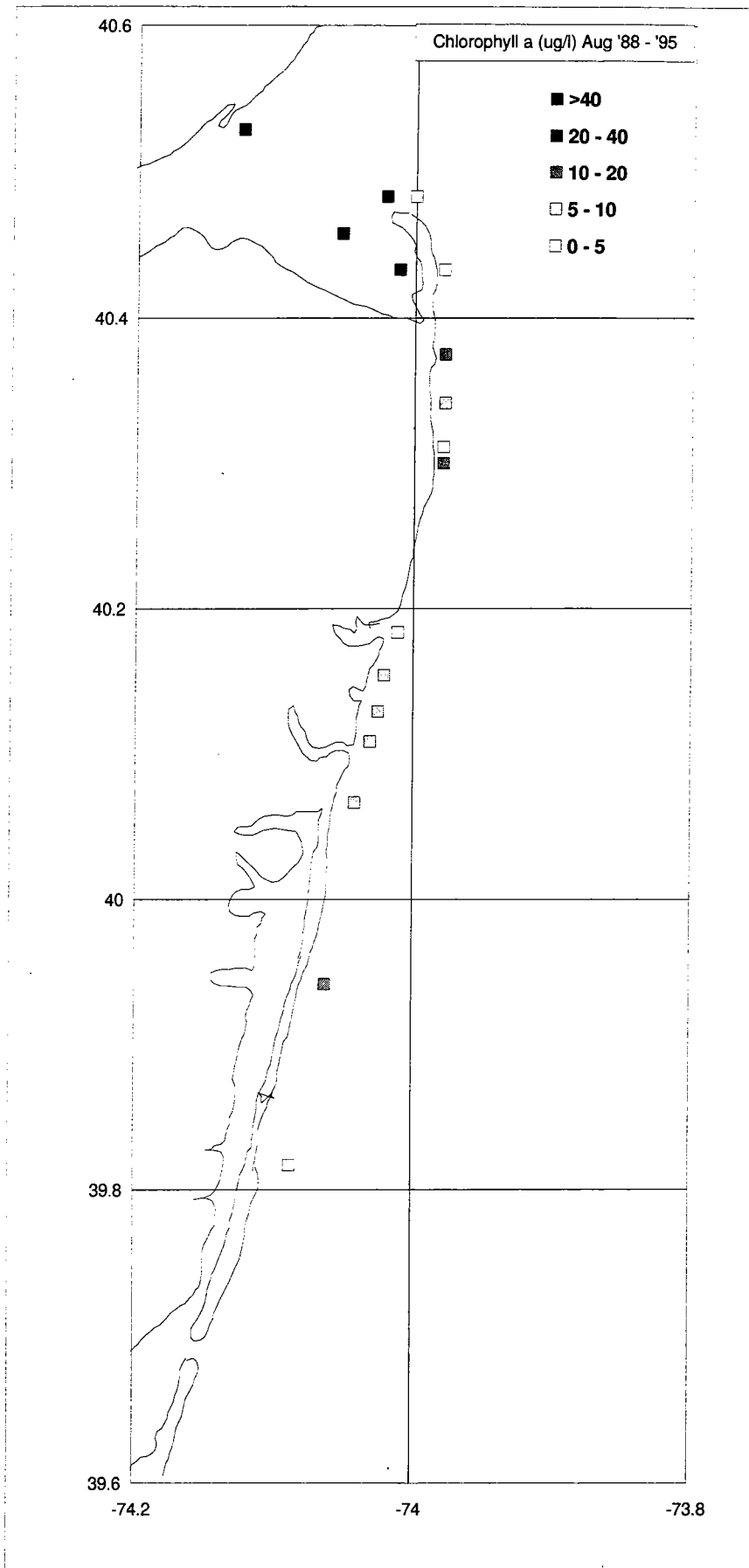
### Long Term Average Chl a by Site And Month

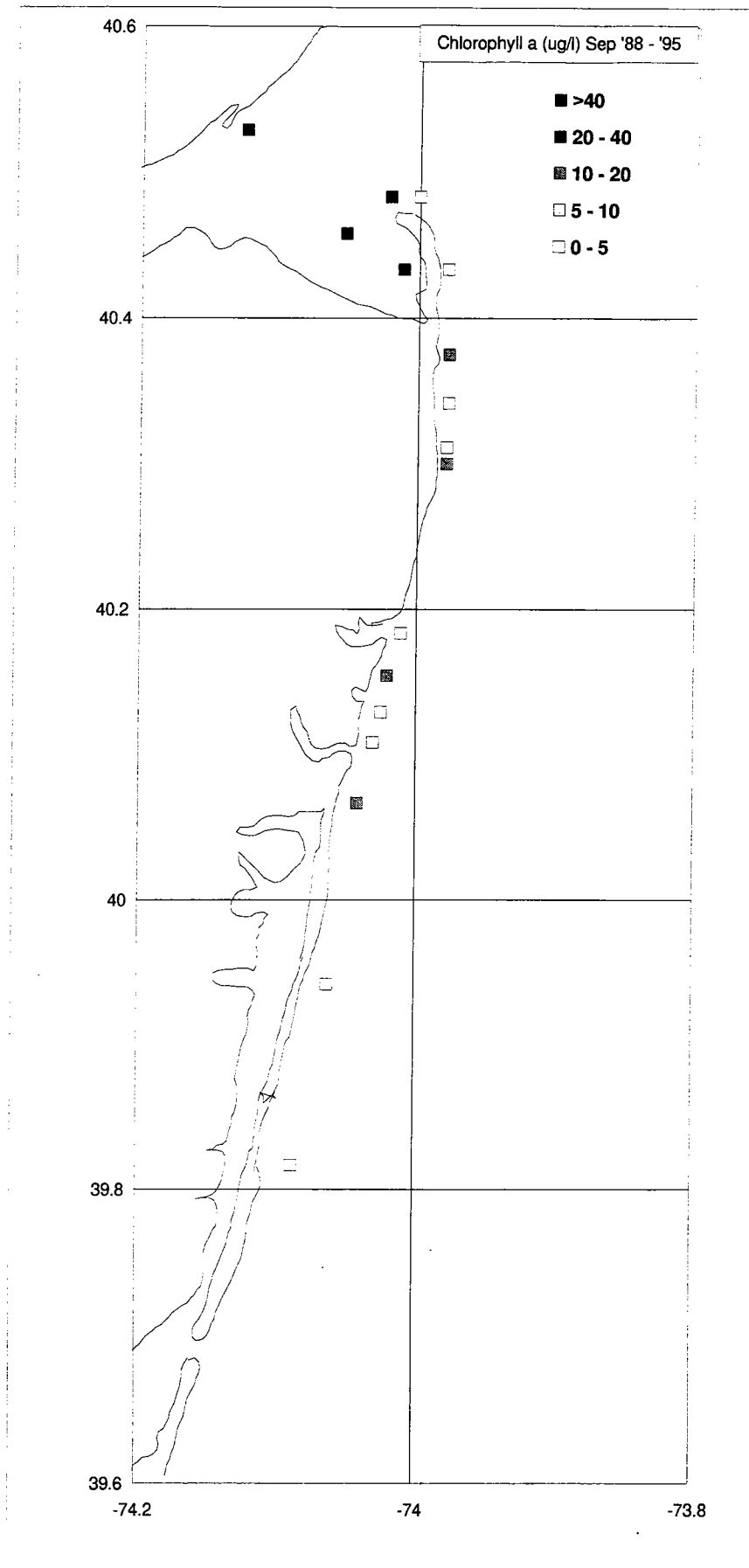
	May	June	July	August	September
JC01A	11.55				
JC03			9.50		
JC08	5.63	21.31	13.15	18.67	11.27
JC11	18.73	9.59	9.61	9.78	4.40
JC13	5.11	9.74	13.77	4.48	2.02
JC14	9.64	8.74	7.50	14.93	13.54
JC26			10.57		
JC30	6.16	10.04	5.62	5.15	16.10
JC33	7.06	5.53	2.93	8.15	2.45
JC35				7.12	
JC41			8.16	5.63	13.73
JC53				12.17	
JC57	11.45	5.08	3.98	4.60	3.95
RB01	8.06	37.20	14.98	43.02	2.35
RB05	61.75	27.77	22.84	46.74	32.74
RB15	32.39	32.37	34.80	35.04	35.63
RB16	35.21	83.43	38.51	40.32	33.60
RB16A		87.84	43.31	43.97	47.99
RB24	35.97	45.15	29.01	67.82	48.49
RB25		99.83	36.44	49.86	39.10
RB25A		103.84	49.15	48.06	40.08
RB32	44.19	30.77	24.86	26.83	26.03
RB34			8.52		
RB4		47.38	37.81	36.44	21.98
RB46		69.80	28.07	55.11	63.91
RB46A		73.79	32.54	59.08	74.00
RB50A		96.24	61.41	48.45	47.82
RB51A	51.05	45.28	55.87	47.30	28.89
RB56A	28.74	32.22	31.77	63.67	
RB57	23.84	49.00	12.34	39.67	23.37
RB59		50.37	21.12	49.47	24.72
RB7		49.05	39.76	18.15	4.75











APPENDIX A4

NPS 1992-1995



## National Park Service Site Descriptions

### JAMAICA BAY

BC	Beach Channel
CB	Canarsie Beach
DPt	Duboise Point
HB	Hanger B, Barren Island
CP	Canarsie Pol
JFK	J. F. Kennedy Airport, runway near Jo Co Marsh
JFKN	J. F. Kennedy Airport, north of runway near Jo Co Marsh
JFKS	J. F. Kennedy Airport, south of runway near Jo Co Marsh *same as JB-12
MPB	East side of Marine Parkway Bridge
NCB	North Channel Bridge
PB	Plumb Beach
RB	Ruffle Bar *same as JB-5
RI-3	Rockaway Inlet, off Brighton Beach
Spring	Northern side of Duck Point Marshes
USCG	U.S. Coast Guard Station, Rockaway Point
JB-5	Ruffle Bar *same as RB
JB-6	Canarsie Pier
JB-8	Mouth of Shellbank Basin, Howard Beach
JB-9	1,000 yards NE of Broad Creek Marsh
JB-11	Center of rail road turntable bridge, Beach Channel
JB-12	J. F. Kennedy Airport, south of runway near Jo Co Marsh *same as JFKS

JB-13                      Head of Bay

JB-14                      Midway between Goose Pond Marsh and Rulers Bar

**SANDY HOOK BAY**

SH1                      Plum Inlet

SH2                      Spermacetti Cove

SH3\*

SH4\*

SH5                      Horseshoe Cove

\* not identifiable from map

Long Term... Average Chl by Site and Month

	1	2	3	4	5	6	7	8	9	10	11	12
BC	2.34	16.84	2.42		3.44	13.79	2.36	9.73				
CB						29.53	93.09	19.58	23.32			
CP						6.31	12.44	3.29	3.46			
Dpt	2.24	11.30	9.89	8.30	4.68	10.64	13.58	10.32	15.19	0.49	0.79	
HB	6.66	11.22	13.10		4.45	4.38	16.31	10.67		1.63	0.88	1.42
JB-11						3.79	11.52	18.13				
JB12						0.20	14.97					
JB-13								11.29				
JB-14					6.30	3.13	5.51	2.07		1.12	0.42	1.15
JB-5						1.88	3.23	13.89				
JB-6						1.79		30.86				
JB-8						4.28	17.64	24.00				
JB-9						3.64	6.89	11.38				
JFK			6.68		2.61	11.22	12.98					
JFKN						2.34	6.64					
JFKS						3.14						
MPB	1.88	11.48	6.57		2.21	5.31	1.88	4.76	4.36	0.50	1.26	1.75
NCB	2.06	11.04	17.79		87.44	8.86	19.29	7.67	6.83	2.54	0.63	1.89
PB	0.46	1.12	3.06		3.94	15.63	11.64	13.00		12.58	0.18	2.06
RB	3.42	18.36	9.00		2.60	7.24	3.28	2.84				
RI	2.39	0.42	1.47		3.97	11.34	13.07	0.44		1.06	0.99	
RI-3	2.34	1.14	2.07			8.85	5.30	6.53				2.37
SH1		9.14	13.00		3.63	5.78	9.25	2.33	2.79			0.08
SH2		1.30	11.61	2.38	14.20	5.89	16.29	3.97	4.05			0.33
SH3							1.96					
SH4		1.26	12.54		8.82	7.54	18.59	4.43	1.11			1.72
SH5		2.58	13.75		32.16	6.17	7.41	6.75	0.84			0.08
SH6		4.26	12.66		19.64	2.61	11.42	7.19	0.37		3.98	1.03
Spring							6.84					
USCG					13.44	2.24	2.09	2.21		0.20		2.13

40.7

### Mean Chlorophyll a (ug/l) Jan '92-95

- >40
- 20 - 40
- ▣ 10 - 20
- ▣ 5 - 10
- 0 - 5

40.6

40.5

40.4

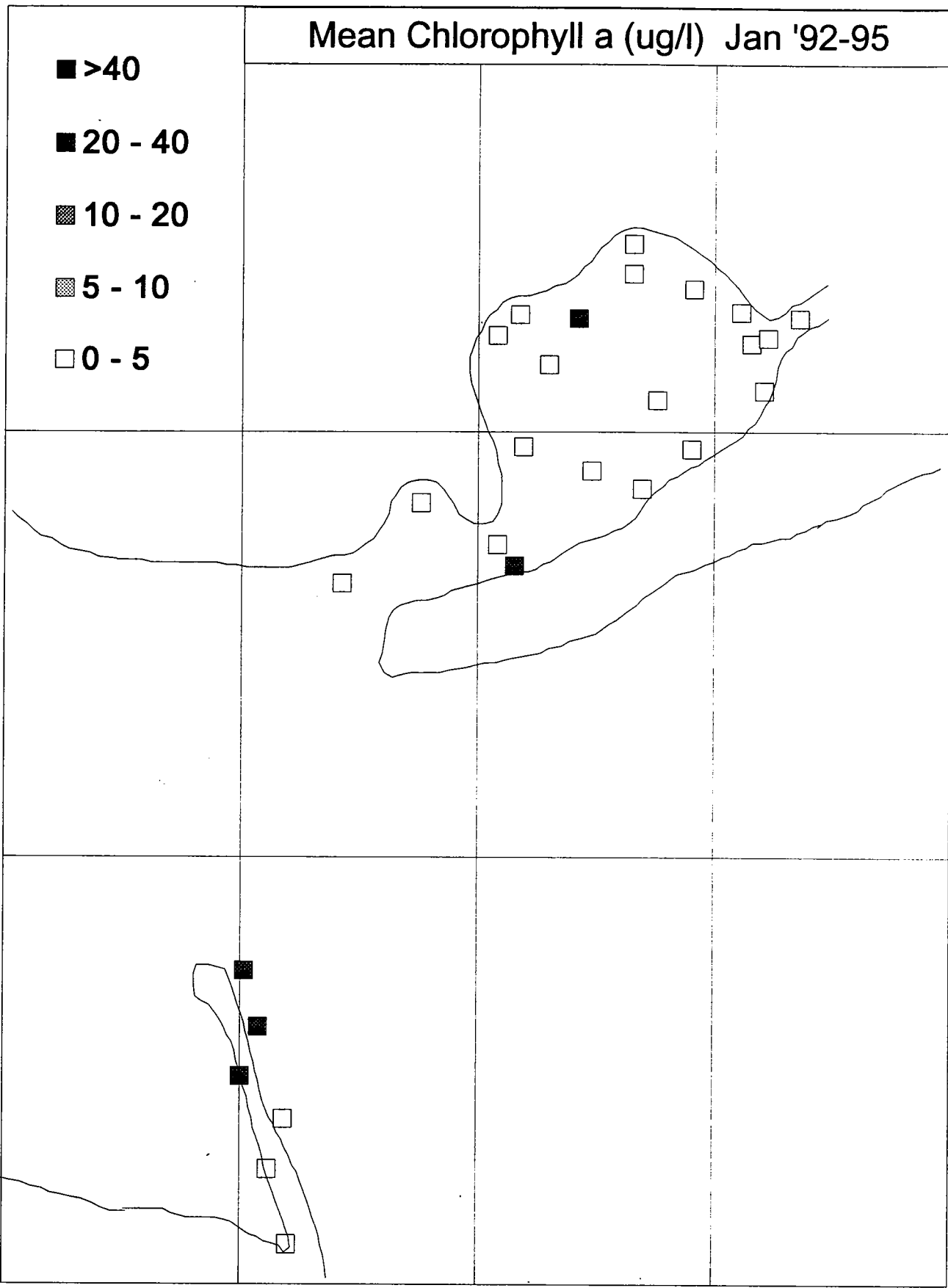
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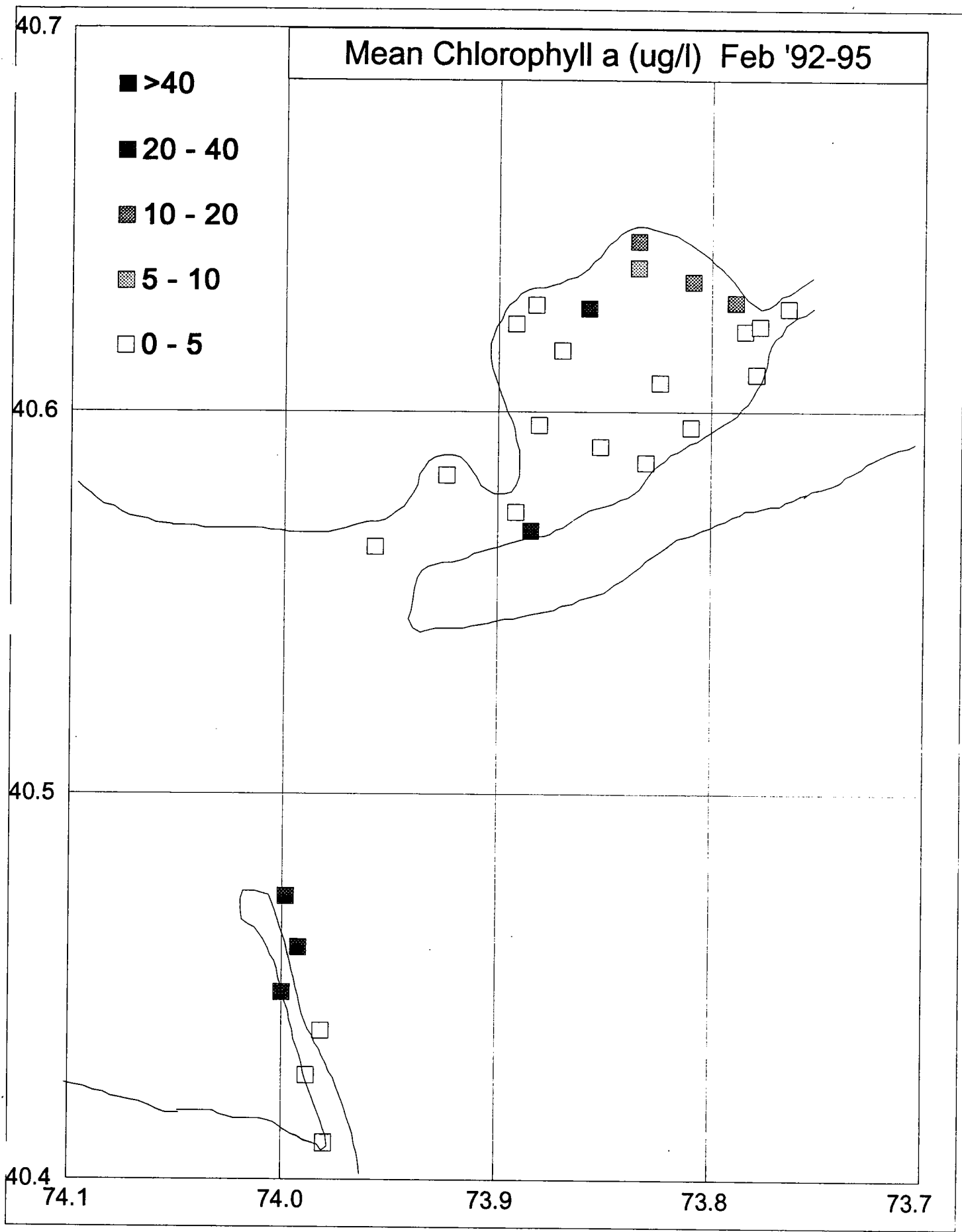
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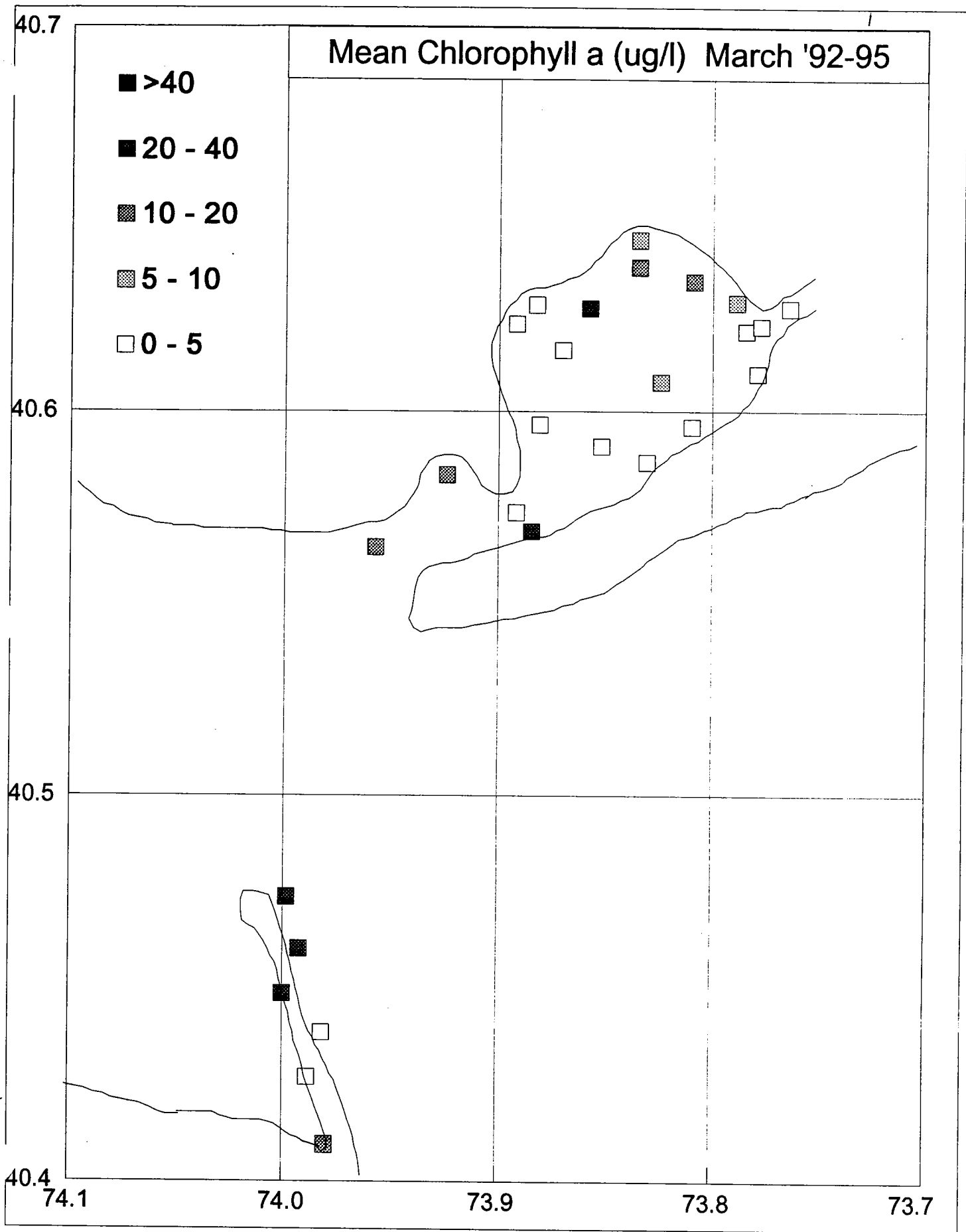
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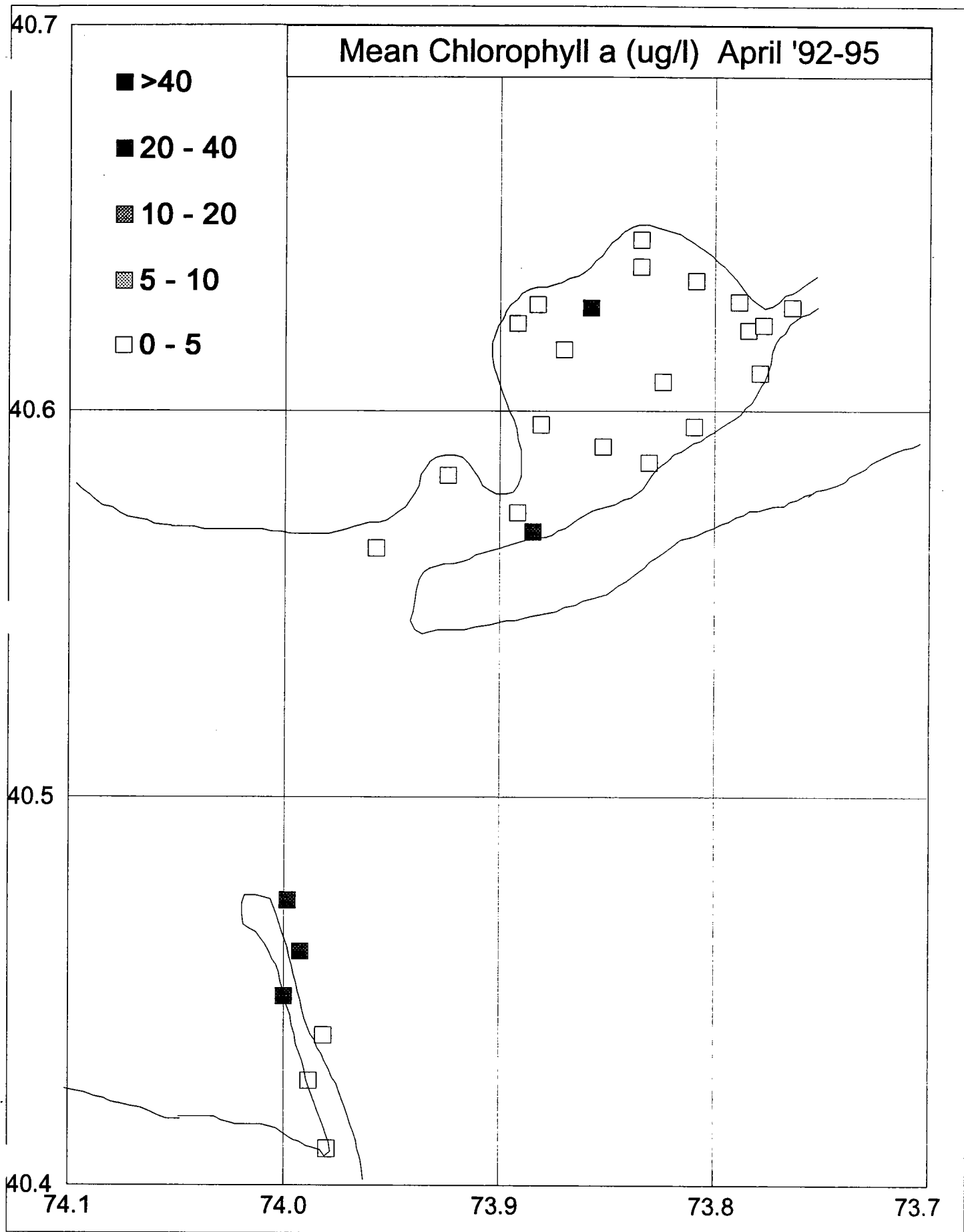
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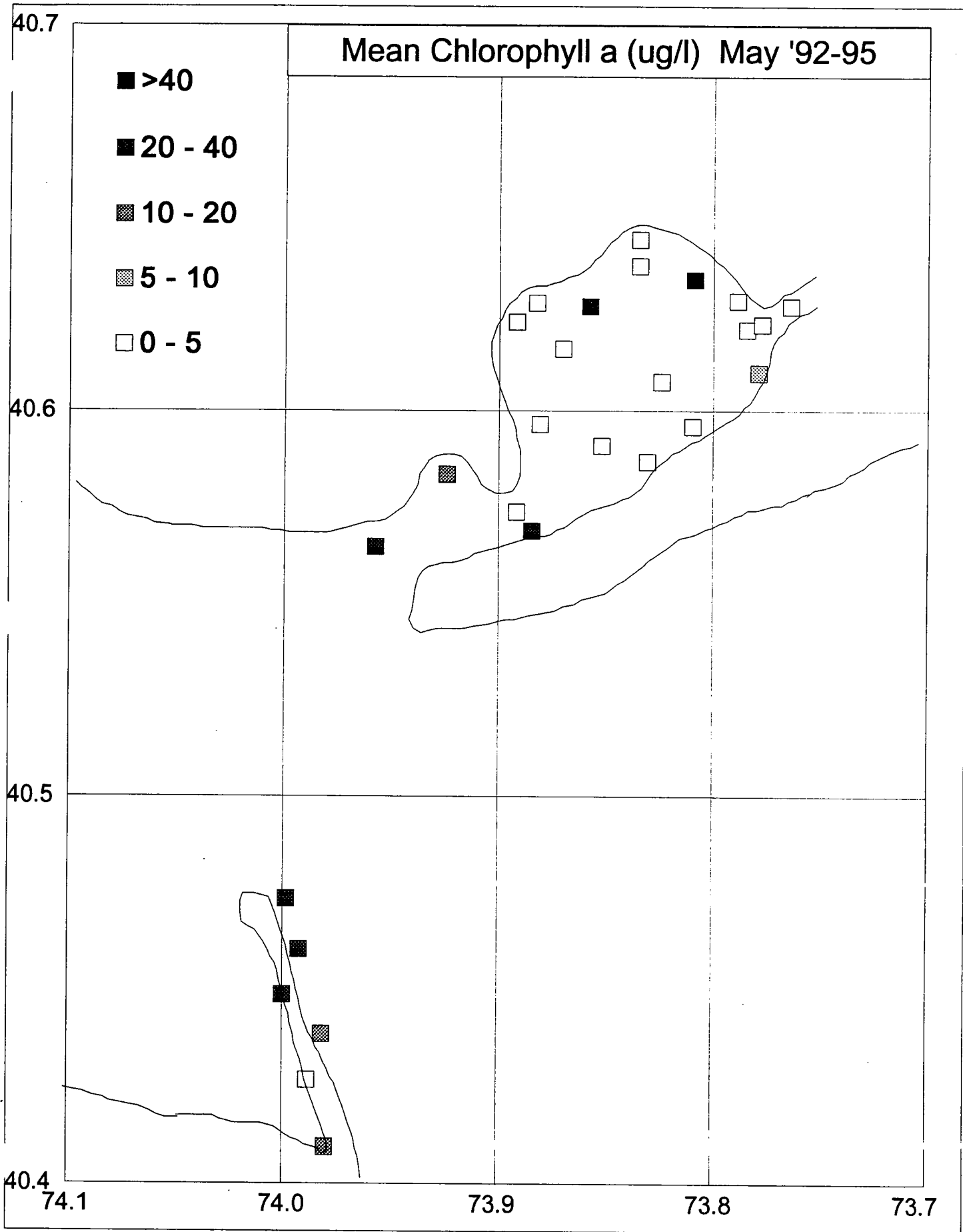
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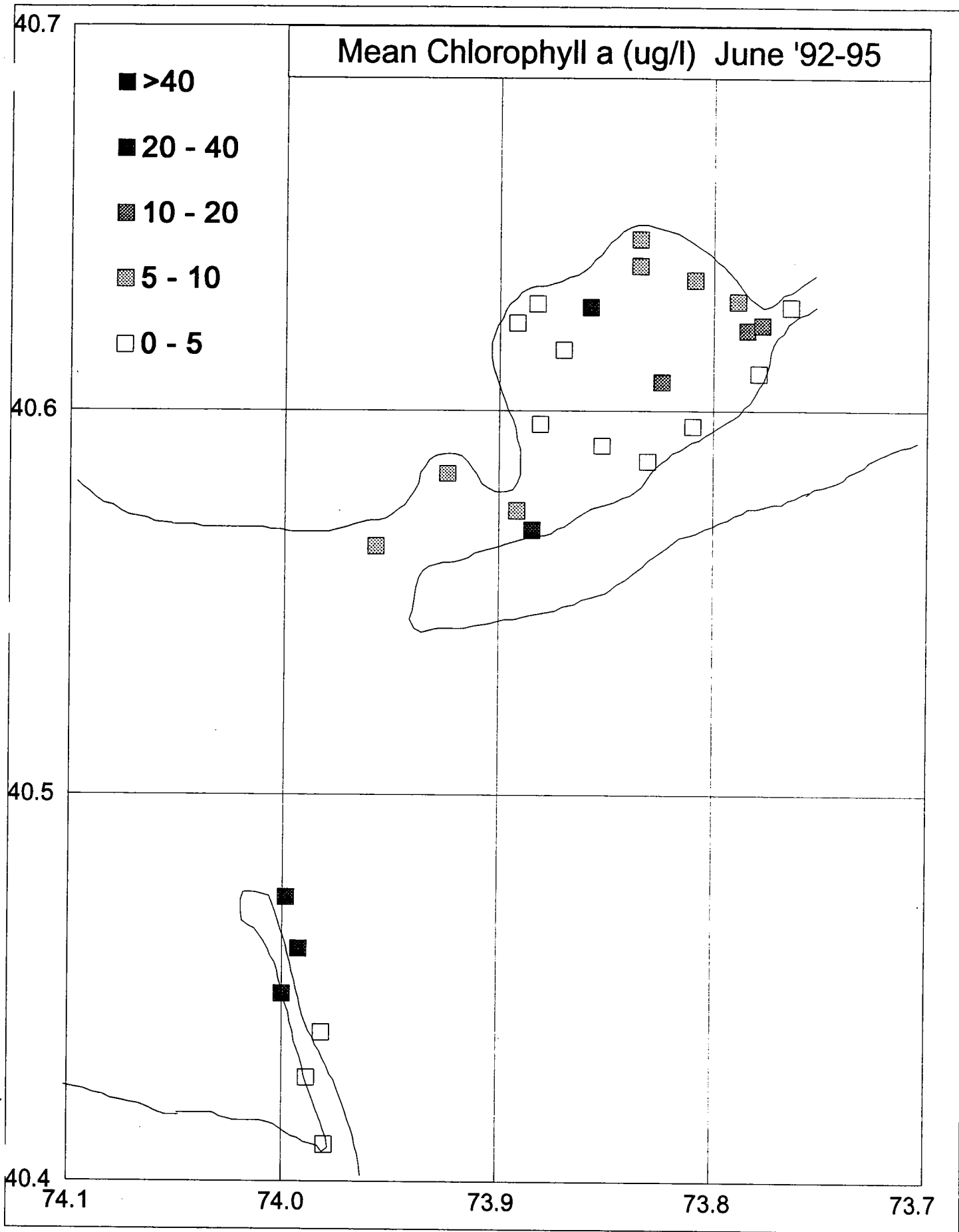


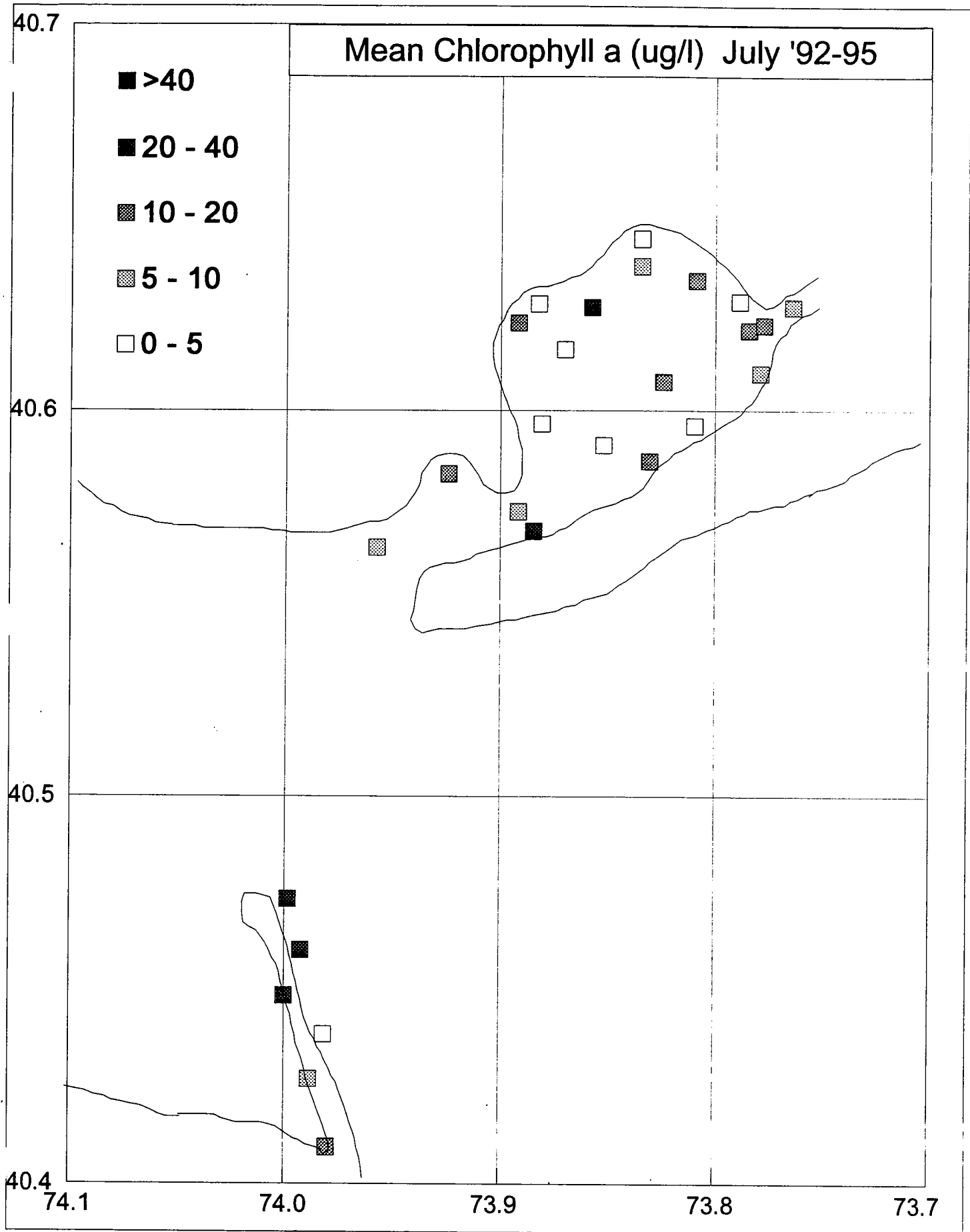


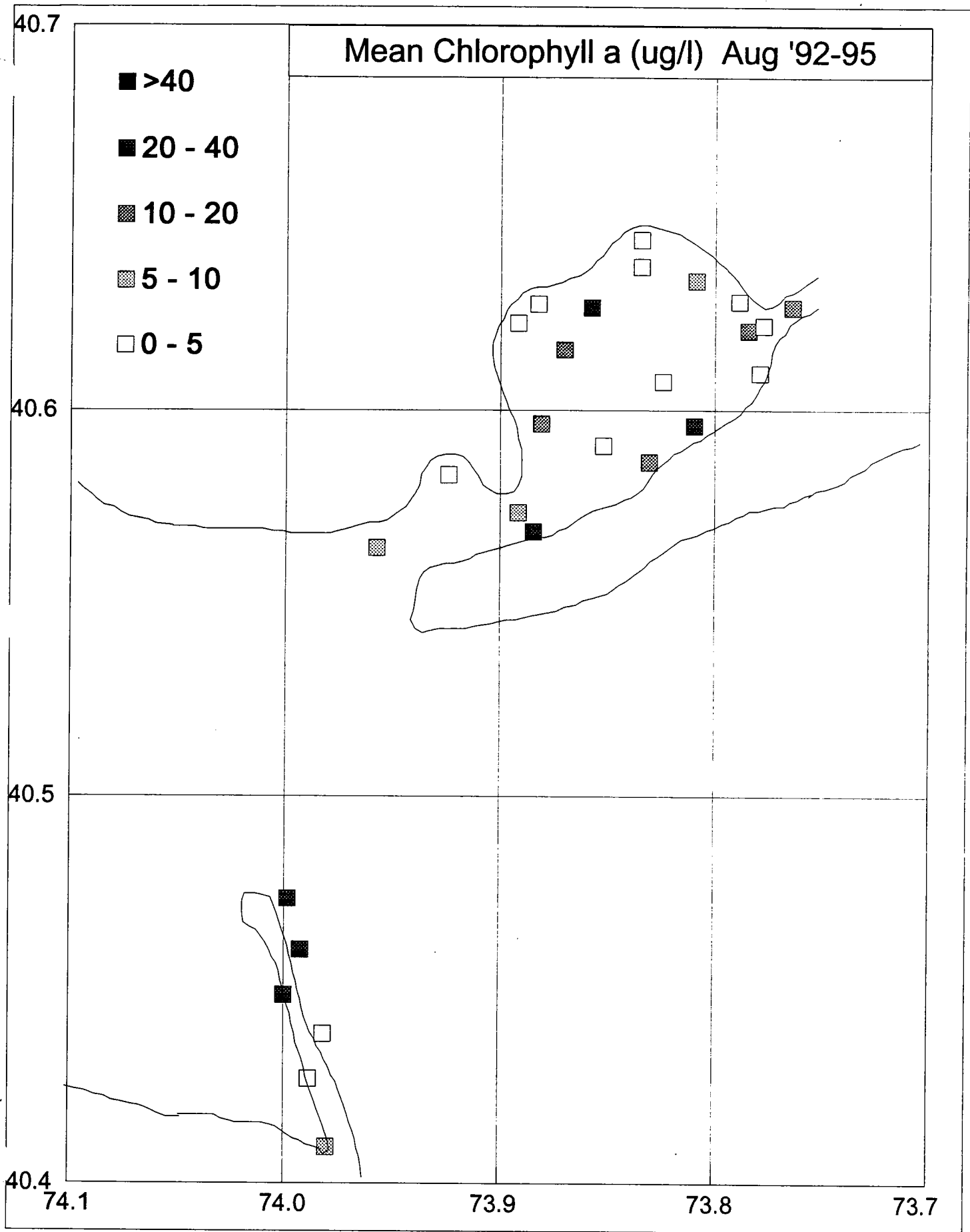


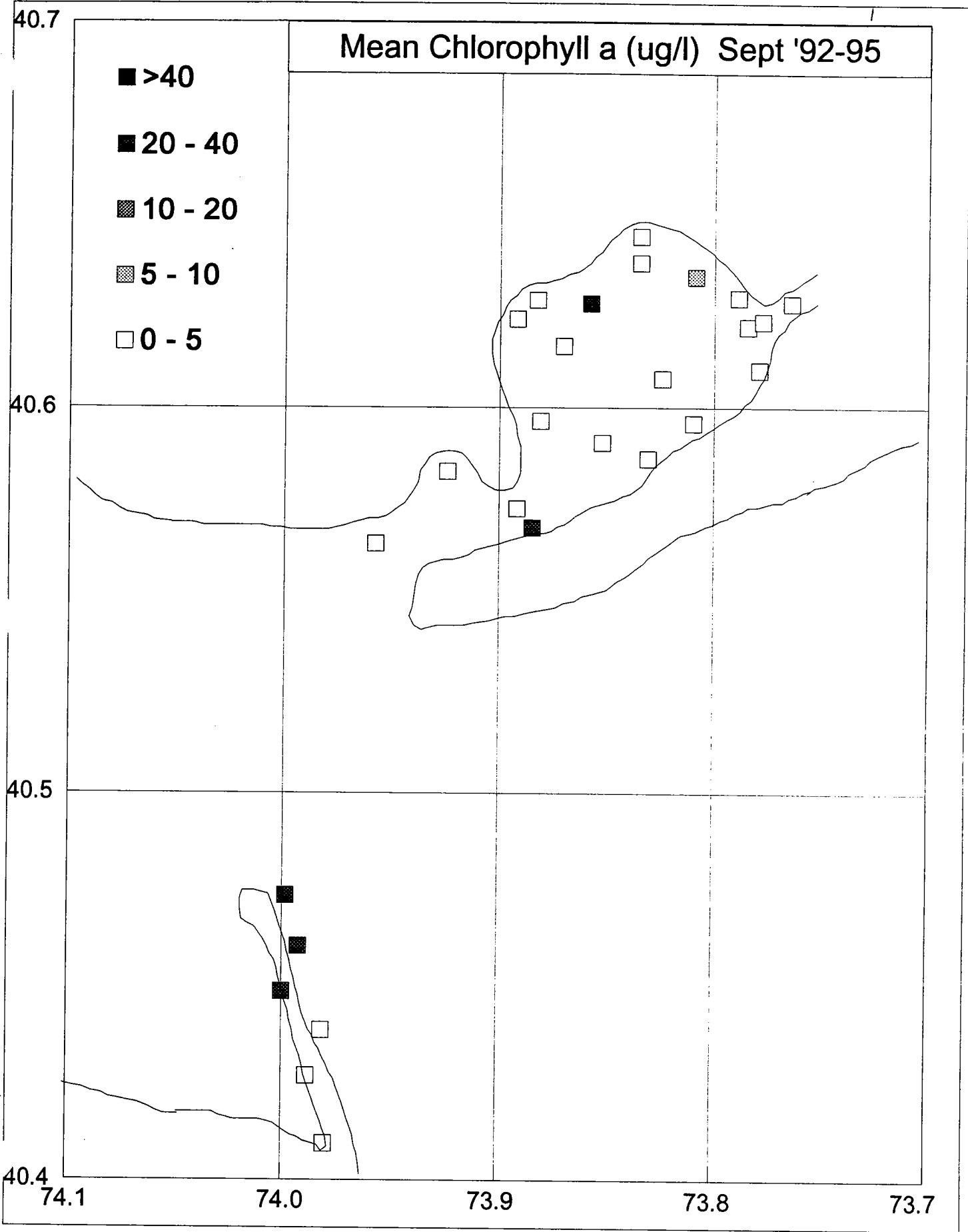












40.7

### Mean Chlorophyll a (ug/l) Oct '92-95

- >40
- 20 - 40
- 10 - 20
- 5 - 10
- 0 - 5

40.6

40.5

40.4

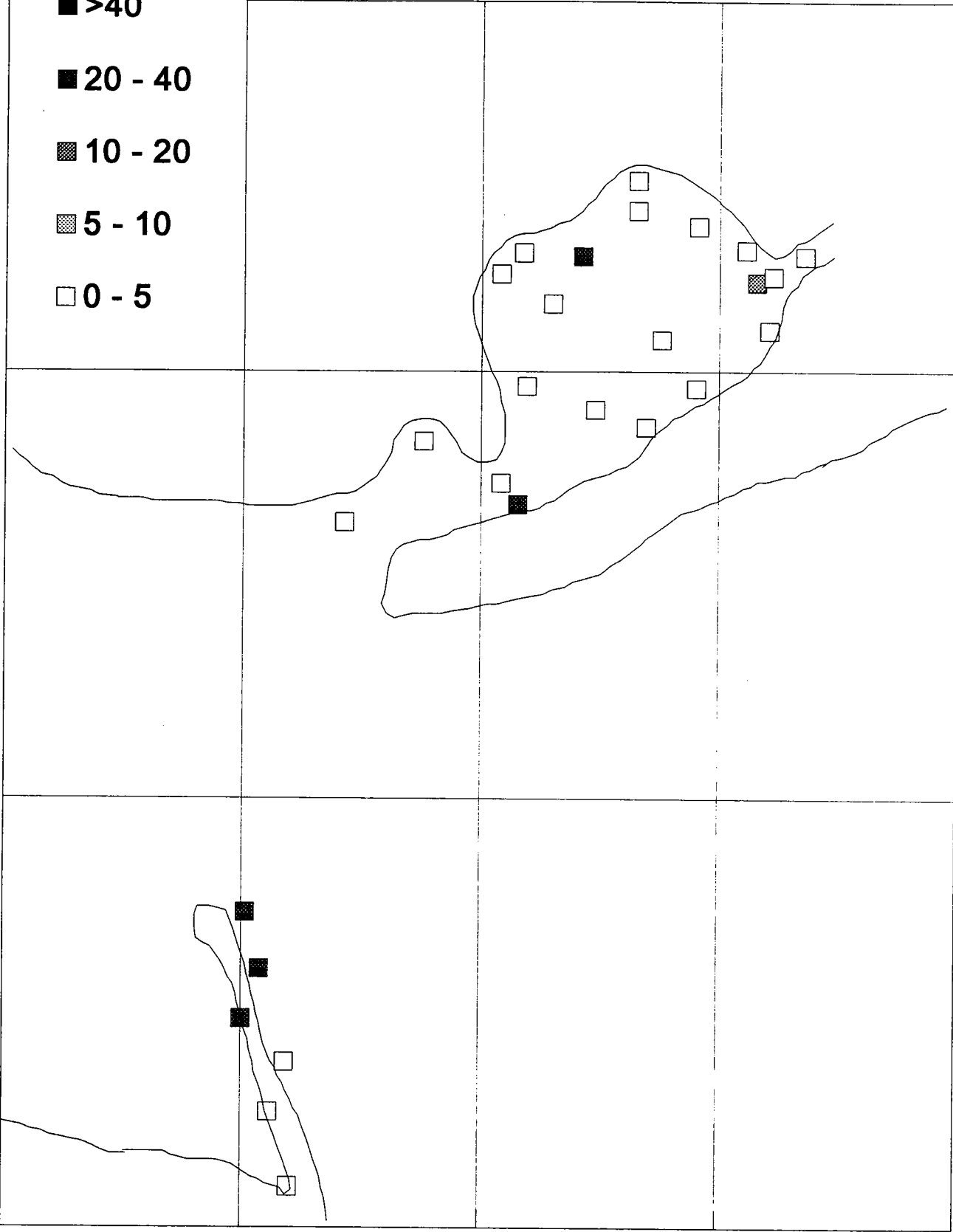
74.1

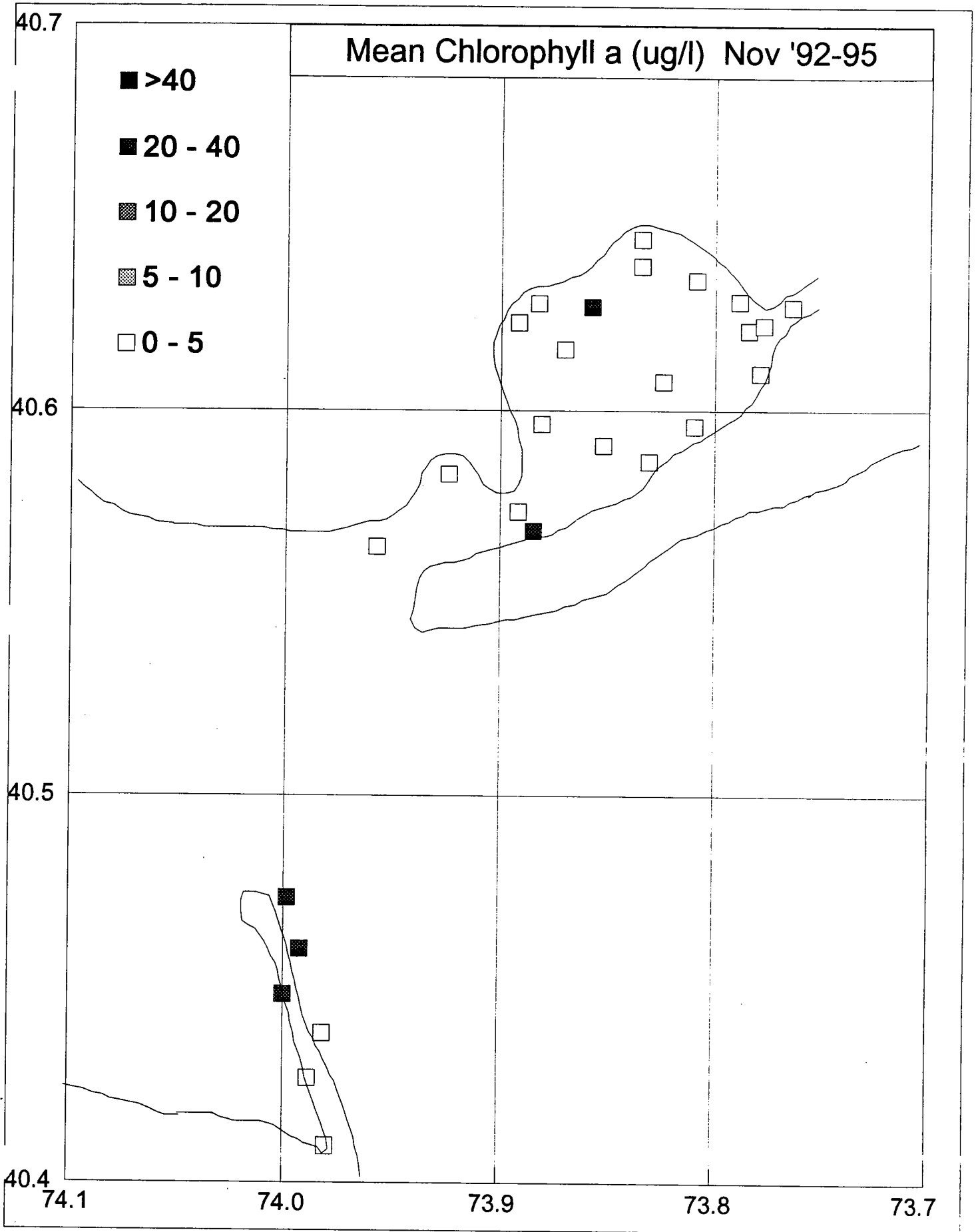
74.0

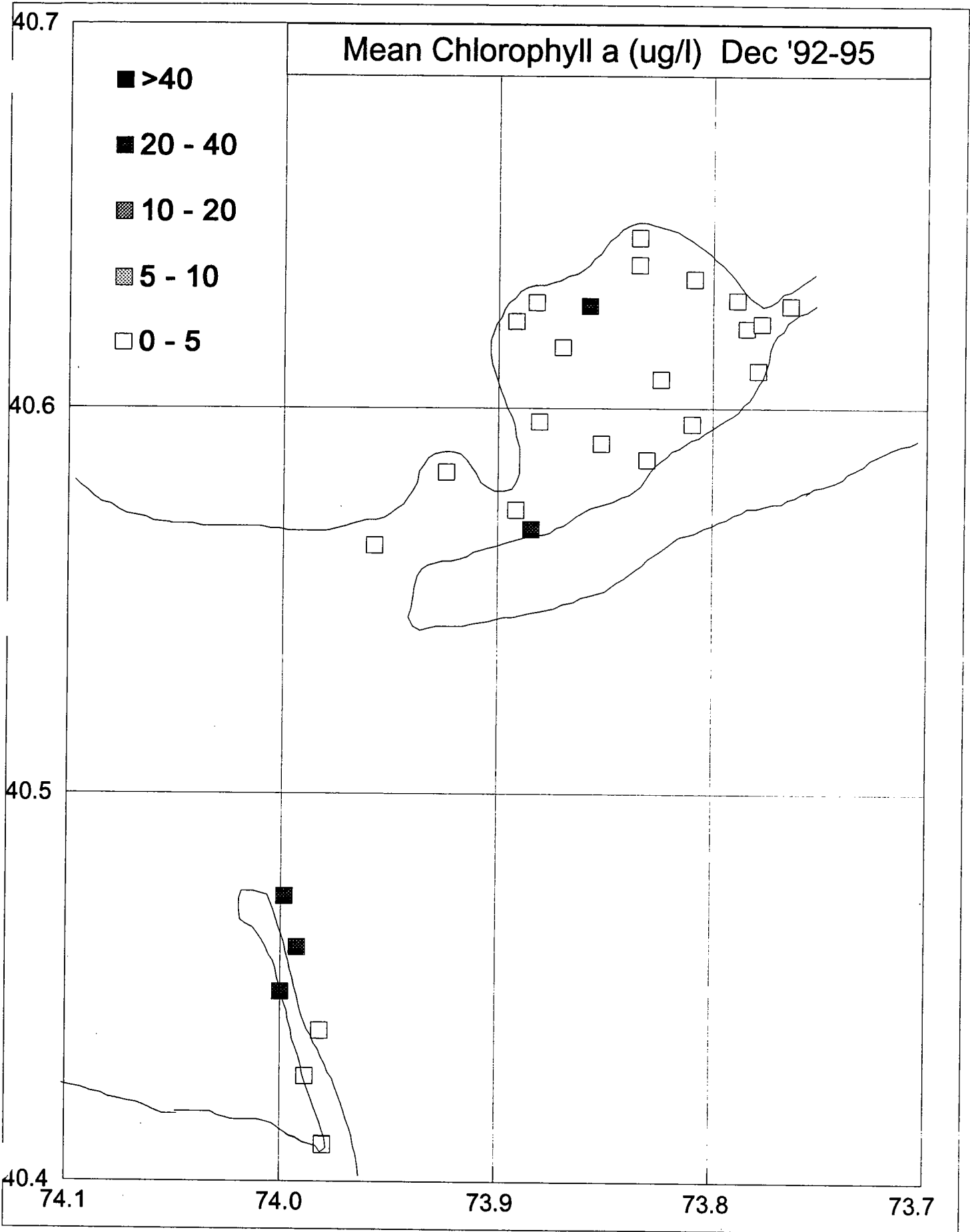
73.9

73.8

73.7







APPENDIX B

Regional Long Term Chlorophyll a Means

1975-1995



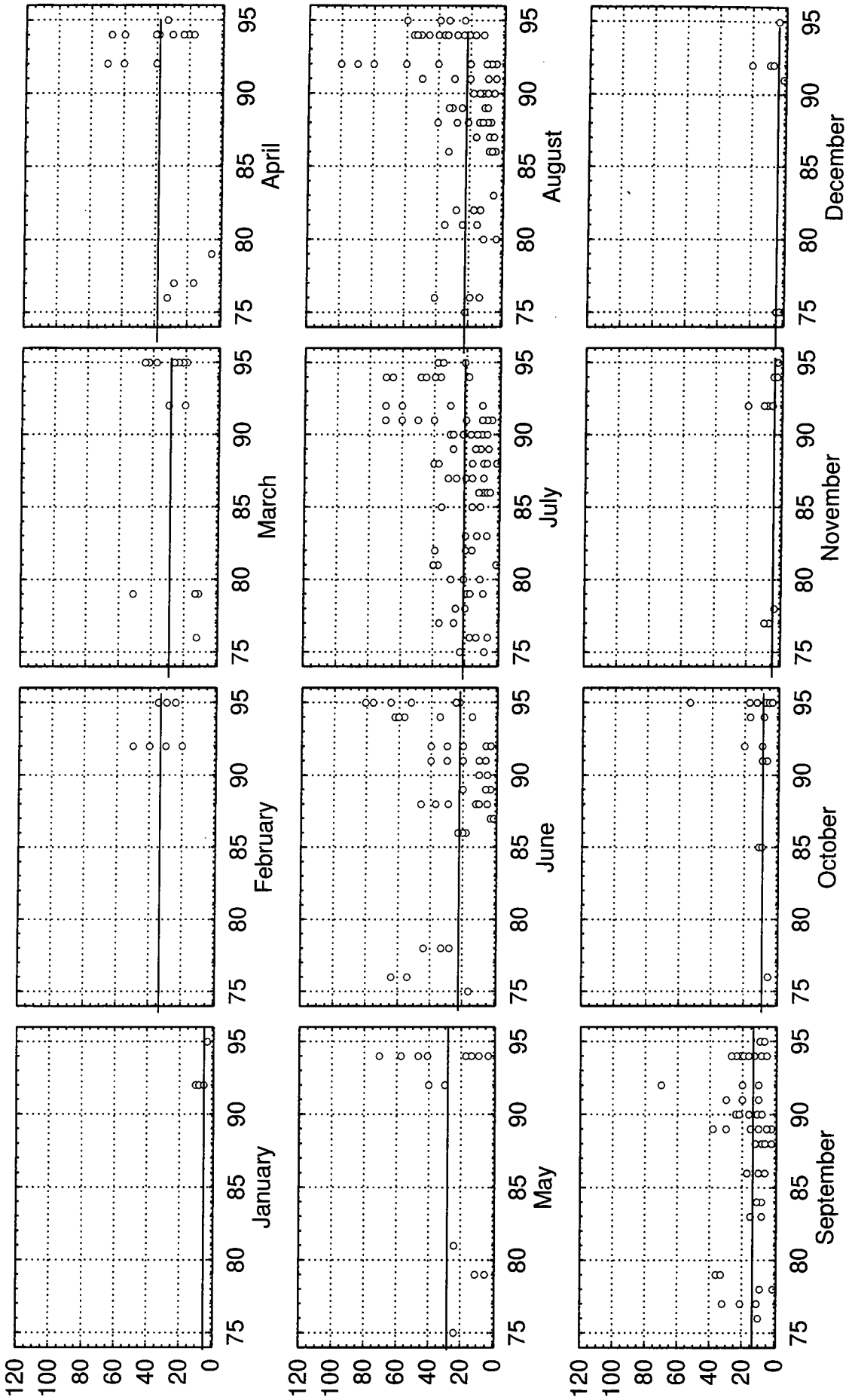
# Area Codes

WLIS	Western Long Island Sound
ER-U	Upper East River
ER-L	Lower East River
NR-U	Upper North River
NR-L	Lower North River
UH	Upper Harbor
LB	Lower Bay
JB-U	Upper Jamaica Bay
JB-L	Lower Jamaica Bay
KVK	Kill Van Kull
RB	Raritan Bay
SHB	Sandy Hook Bay
JCN	Northern Jersey Coast
JCM	Mid-Jersey Coast
JCS	South Jersey Coast

Long Term Means for Chlorophyll a by Site 1975 -1995

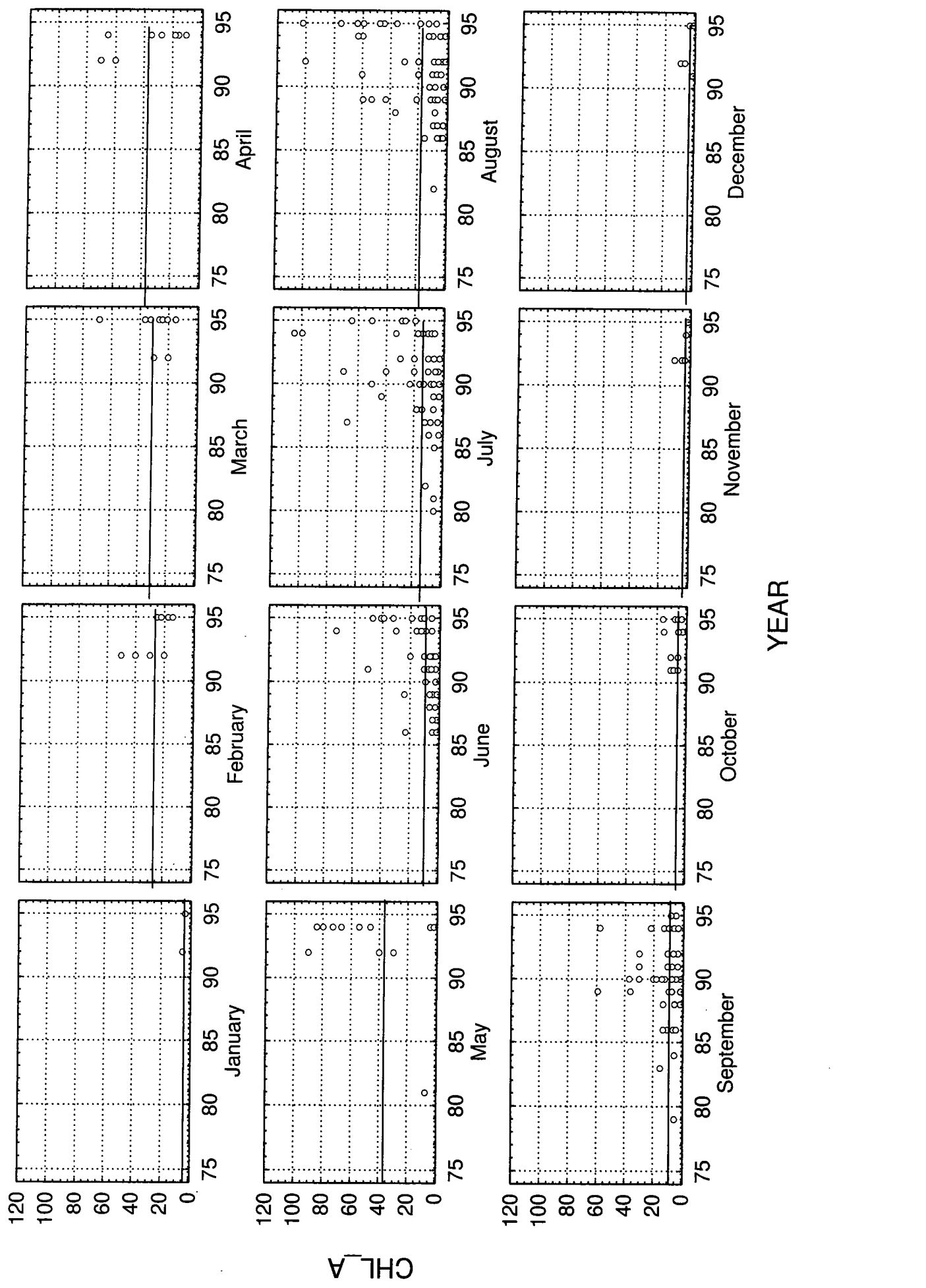
	January	February	March	April	May	June	July	August	September	October	November	December
ER-L	1.89	8.69	14.37	19.16	13.52	3.21	4.71	5.89	4.16	1.98	1.63	2.12
ER-U	3.29	26.25	31.86	37.46	35.91	10.56	15.28	18.31	10.27	5.65	3.46	3.78
HARLEM	1.48	4.70	4.93	4.00	7.31	4.64	5.85	6.21	3.82	1.96	1.45	1.86
JB-L	14.05	43.88	28.62	43.53	17.08	34.95	21.97	20.92	24.33	13.87	6.97	9.40
JB-U	25.95	67.89	45.03	59.98	24.70	38.17	33.02	26.79	29.53	21.91	13.61	18.73
JCM					6.76	7.14	5.38	6.85	8.88			
JCN		1.92	13.15		13.00	11.38	11.22	13.00	8.28			1.17
JCS					11.45	5.08	3.98	5.00	3.95			
KVK	5.41	15.73	34.45	44.72	27.05	14.07	14.32	13.67	9.84	5.99	5.27	2.25
LB	3.91	16.46	12.45	24.48	23.51	19.70	14.48	17.27	13.37	8.91	3.57	2.32
NR-L	0.89	3.13	4.49	3.96	9.62	7.29	7.44	11.76	9.46	3.68	1.90	1.91
NR-U	0.53	1.61	2.12	2.64	12.92	8.26	8.80	12.72	7.71	5.83	2.99	2.00
RB					25.42	59.94	23.43	47.26	34.29			
SHB		4.90	12.42	2.38	31.90	36.53	36.61	41.96	29.99		3.98	0.56
UH	2.40	6.10	5.01	14.66	6.59	7.76	7.79	8.51	5.00	3.47	2.51	1.00
WLIS	5.49	33.14	28.09	38.23	29.27	24.12	23.81	22.83	14.26	10.48	6.25	7.23

Chlorophyll a - Western Long Island Sound

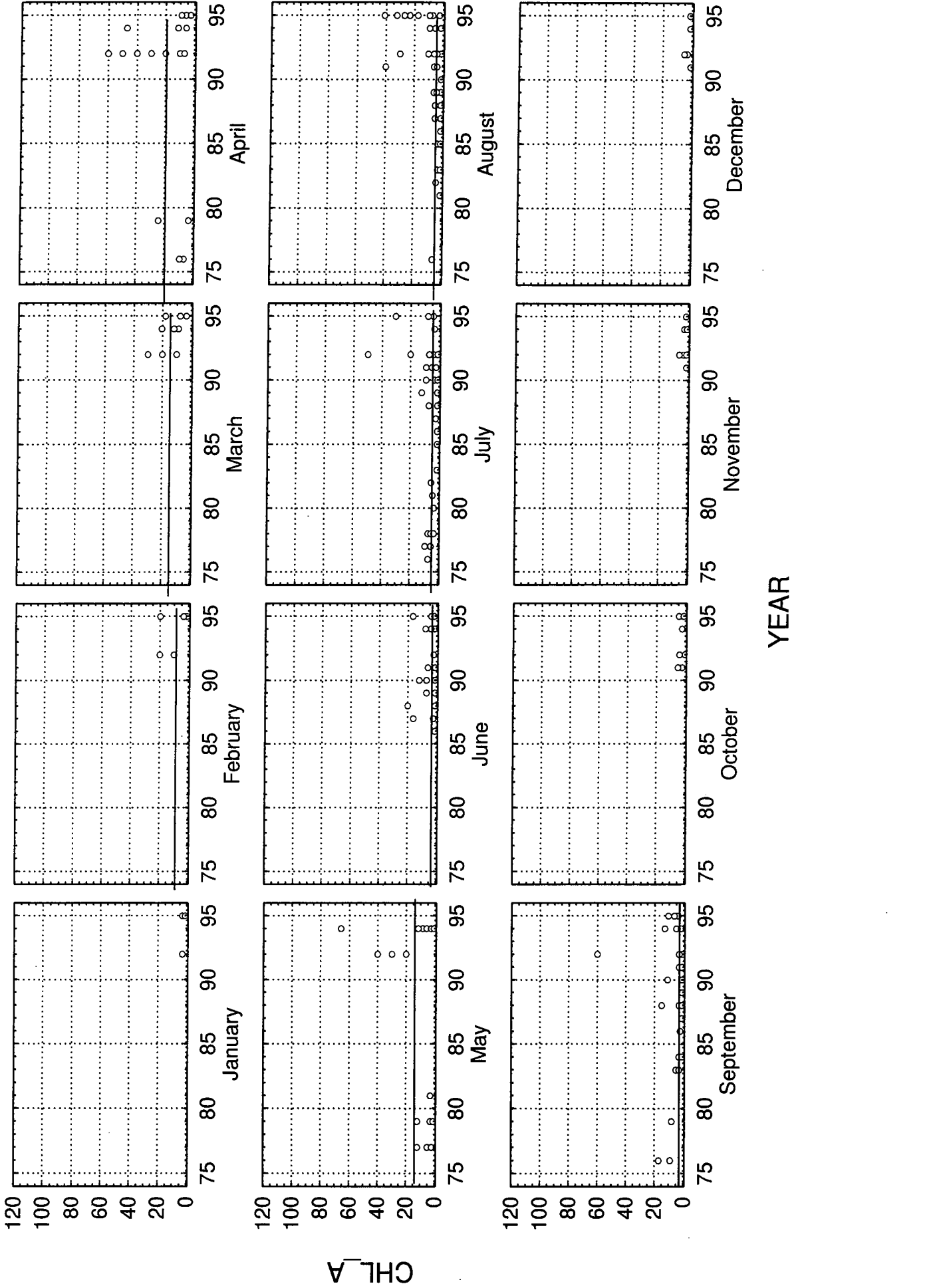


YEAR

# Chlorophyll a Upper East River



Chlorophyll a Lower East River



CHL\_A

YEAR

