CONTAMINANT STATUS OF COOTES PARADISE SEDIMENTS IN THE VICINITY OF THE MARSH RESTORATION PROJECT

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Management Perspective

A marsh restoration project has been proposed for Cootes Paradise to recreate some of the lost marsh. Dredging will be required during the initial stages of the project and dredging activity in Ontario is subject to sediment quality guidelines. Three previous studies have sampled sediments in the vicinity of the proposed dredging activity. We have examined the previous data and conclude that the sediments are low in contaminants and suitable for unrestricted land use.

Perspective de gestion

Un projet de remise en état des marais a été proposé à Cootes Paradise afin de remettre en état certains marais perdus. Les premières phases du projet nécessiteront un dragage et celui-ci est sujet à des lignes directrices relatives à la qualité des sédiments en Ontario. Trois études antérieures ont permis d'échantillonner les sédiments dans les environs des sites proposés. Nous avons examiné les données antérieures et en avons conclu que les sédiments avaient de faibles teneurs en contaminants et pouvaient être dragués sans restriction.

INTRODUCTION

A restoration project is proposed for the south shore of Cootes Paradise to recreate the marsh that once existed. Concern has been expressed regarding the level of contaminants in the sediments within the proposed area since previous studies have detected high levels of contaminants in other areas of Cootes Paradise. To ensure those contaminants pose no threat to the waterfowl that will be attracted to the marsh, we have reviewed all past reports dealing with sediment contamination.

INFORMATION SOURCES REVIEWED

On three occasions, sediment samples have been obtained and analyzed for contaminants. In 1974, Mudroch & Capobianco obtained sediment cores at two locations (Figure 1, 3_m, 4_m). The cores were sectioned in 10 cm intervals and analyzed for Pb, Cu, Zn, Cr, As, Cd, and Hg. In 1975, the Ministry of Environment (MOE) obtained Eckman grab surface sediment samples at four locations (Figure 1; MOE, 1977). Stations 2 & 3 were analyzed for Pb, Cu, Zn, Cr, As and Cd. Stations 3_{oc} & 4_{oc} were analyzed for chlorinated hydrocarbons, including PCB's. The Eckman grab sample is assumed to sample the top 10 cm surface sediment. In 1980, MOE obtained sediment cores again at stations 2 & 3 and determined Pb, Cu, Zn, As, Cd concentrations at varying core depths. All information has been tabulated and averaged to illustrate the metal concentrations in a hypothetical sediment profile from the proposed marsh site. The open water disposal guidelines and the unrestricted land use guidelines are also included (Table 1).

DISCUSSION

All contaminants except zinc were below the open water disposal guideline. Zinc is an essential element for all organisms and was below the unrestricted land use guideline.

The available information allowed us to construct a contaminant profile to a depth of 130 cm. No significant change in any of the contaminant concentrations over depth was observed. If anthropogenic loadings had been significant, we would have expected elevated concentrations near the sediment surface.

The open water disposal guideline developed in the early 1970s are based upon samples obtained from the Great Lakes and analyzed to determine the level of elements present in pre-colonial sediment unaffected by anthropogenic loadings. Therefore, sediments collected and found to have concentrations below the open water disposal guideline are felt to be uncontaminated. Recent information would suggest that some contaminants in pre-colonial sediments have greater concentrations than the M.O.E open water guideline (Mudroch et al., 1988). Zinc, for example was found to vary from 83-210 ppm in background sentiments for Lake Ontario. Therefore, our average Zinc concentration of 143 ppm is not significantly different from background concentration of Lake Ontario.

We conclude that the sediment within the marsh creation site is safe and unaffected by anthropogenic loadings.

REFERENCES

Mudroch, A. and J. A Capobianco. 1979. Effects of Treated Effluent on a Natural Marsh. JWPCF 51: 2243-2256.

M.O.E. 1977. A Water Quality Study of Cootes Paradise. pg. 83.

M.O.E. 1986. Cootes Paradise Study, 1986. pg 13.

Mudroch, A., L. Sarazin, and T. Lomas. 1988. Summary of Surface and Background Concentrations of Selected Elements in the Great Lakes Sediments.

Figure 1
Cootes Paradise Sediment Sampling Locations

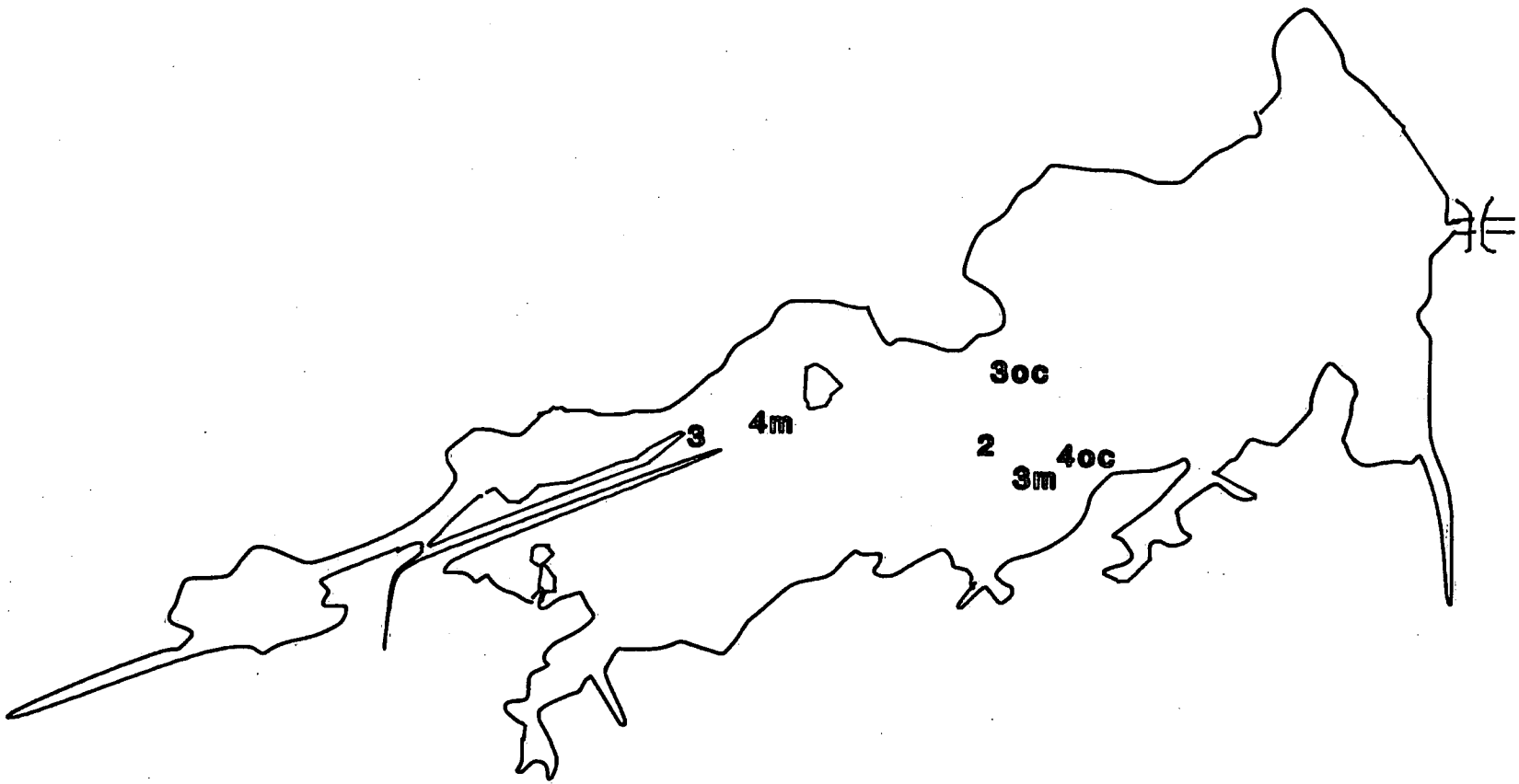

Table 1

Cootes paradise Sediment Profile
"A water quality study of Cootes Paradise"

Station	Pb	Ni	Cu	Co	Cr	Zn	As	Hg	Cd	PCBs
2	48		40			224	4.4		1.2	
3	28		32			192	2.5			
3oc										0.02
4oc										0.03

"Selected Great Lakes Coastal Marshes"

Station	Depth	Pb	Ni	Cu	Co	Cr	Zn	As	Hg	Cd
3m	0-10	45	23	36	5	12	180	6	0.05	<1
	10-20	20	20	25	5	10	105	5	0.03	<1
	20-30	25	15	23	3	10	100	6	0.035	<1
	30-40	20	12	20	5	11	110	5	0.03	<1
	40-50	42	28	46	8	16	230	10	0.09	<1
	50-60	46	26	44	8	16	470	7	0.06	<1
4m	0-10	44	17	28	3	10	150	4	0.06	<1
	10-20	45	16	30	4	9	150	5	0.05	<1
	20-30	35	15	32	4	10	140	6	0.05	<1
	30-40	30	10	31	4	8	120	5	0.05	<1
	40-50	20	7	28	3	9	90	6	0.05	<1
	50-60	10	5	15	1	5	50	3	0.01	<1
	80-90	15	6	10	1	5	55	2	0.01	<1
	120-130	25	16	32	4	11	130	7	0.03	<1

Cootes Paradise Study '86

Station	Depth	Pb	Cu	Zn	As	Cd
2	0-12	38	32	180	4.5	0.65
	12-22	35	30	150	3.6	0.7
	22-26	27	33	150	4.8	0.88
	26-40	28	38	190	6.4	0.5

3		Pb	Cu	Zn	As	Cd
	0-9	29	28	150	3.6	0.35
	9-19	19	15	87	2.5	0.35
	19-42	17	28	94	4	0.3
	42-48	21	34	130	6.1	0.3
	48-56	37	43	220	8	0.78
	56-64	28	38	230	7.4	0.95

AVERAGE	DEPTH	Pb	Ni	Cu	Co	Cr	Zn	As	Hg	Cd
	0-10	39	20	33	4	11	179	4	0.06	0.73
	10-20	30	18	25	5	10	123	4	0.04	0.53
	20-30	26	15	29	4	10	121	5	0.04	0.59
	30-40	24	11	29	5	10	129	5	0.04	0.40
	40-50	28	18	36	6	13	150	7	0.07	0.30
	50-60	31	16	34	5	11	247	6	0.03	0.78
	80-90	15	6	10	1	5	55	2	0.01	
	120-130	25	16	32	4	11	130	7	0.03	

Open water Disposal Guidelines									
	50	25	25	50	25	100	8	0.3	1	0.05
Unrestricted Land	60	32	100	20	120	220	14	0.5	1.6	2