Illinois River Sediment Quality and Beneficial Use Options

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- Reservoirs, river backwaters, and detention ponds are filling with sediment washed from land and stream banks. This destroys aquatic habitat, recreational potential and water supply functions. If a use can be found for the sediment, dredging to restore water depth becomes more feasible. Dredged material with suitable chemical and physical properties can provide needed topsoil at a variety of sites. This beneficial use can make dredging more economical as value is added at the restored site as well as the location receiving soil. It will also reduce the amount of soil taken from one area to benefit another.

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Beneficial Use as Soil can

Restore economic and ecological values in aquatic systems

Provide soil for restoration and remediation

Reduce the need for taking soil from one area to benefit another

- The Illinois State Water Survey operates a coring rig capable of penetrating ten feet of mud. The cores are carefully opened in a laboratory, photographed, and described. Slices are taken along the length for chemical analysis, fertility testing, agronomic characterization, and determination of various physical properties.


VG-2
11/21
Top

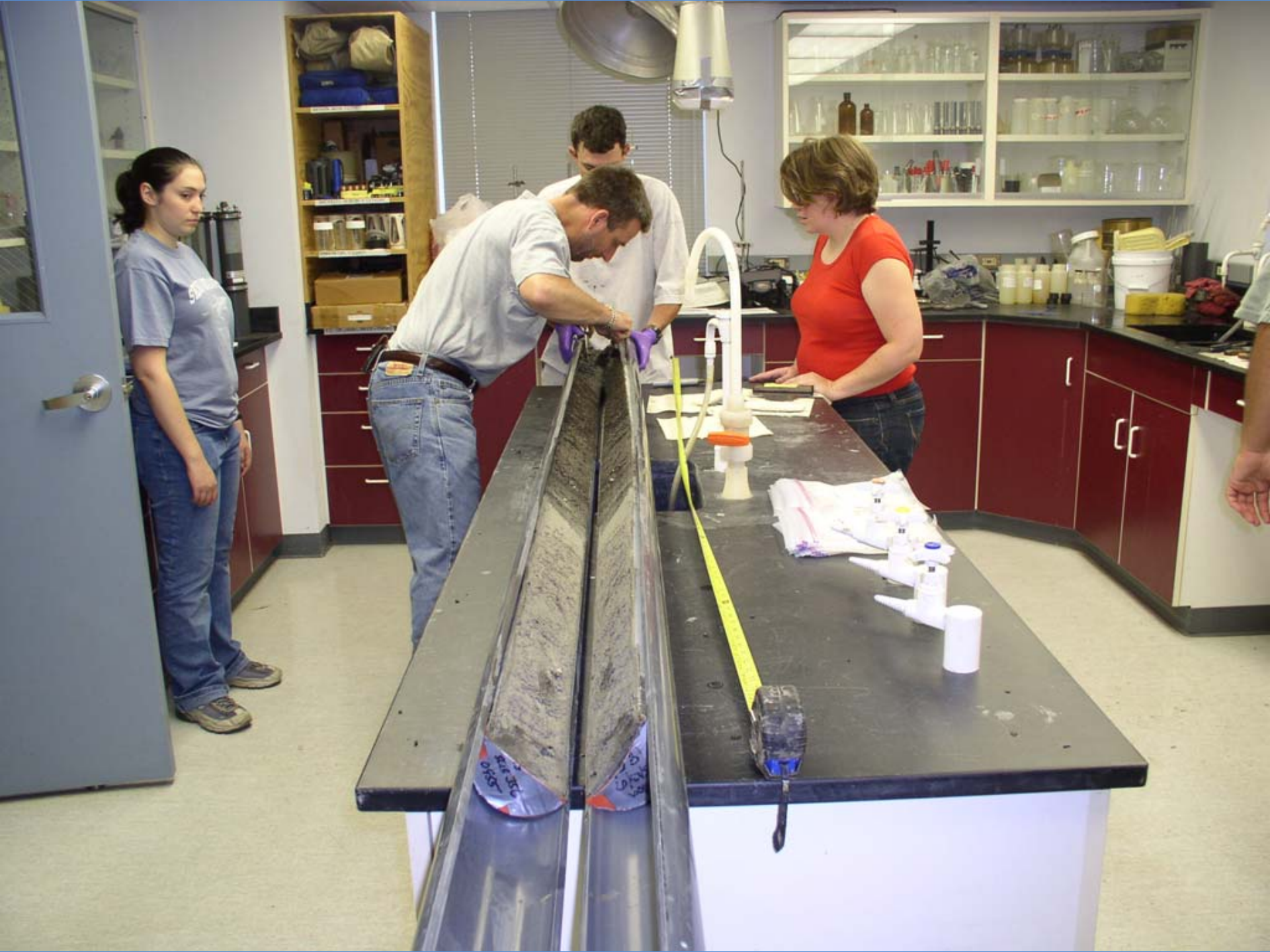

Johnson
Alumaweld


YAMAHA
40


Caribbean

Evaluation of Sediment Cores

- Potential Chemical Contaminants
- Agronomic Fertility
- Soil Classification and Consistence
- Grain Size
- Moisture Content, Density, etc.




354 Douglas LK
4.11.07


Ziploc
FREEZER


HUE 5Y
MUNSELL® SOIL COLOR NAME DIAGRAM
MUNSELL® SOIL COLOR
5Y
VALUE
CHROMA


Do it Best
Quality Paints.
5/25/06
S
10-12cm
30-32cm

- Cores collected from Putnam to Cass County have been analyzed and described. The following slides provide draft data on the properties of several cores. Collectively they illustrate the differences within individual locations as well as over the length of a core. These differences are due to such factors as the depth of water created by the diversion and dams, sedimentation rates, and discharge of chemical contaminants over the decades.

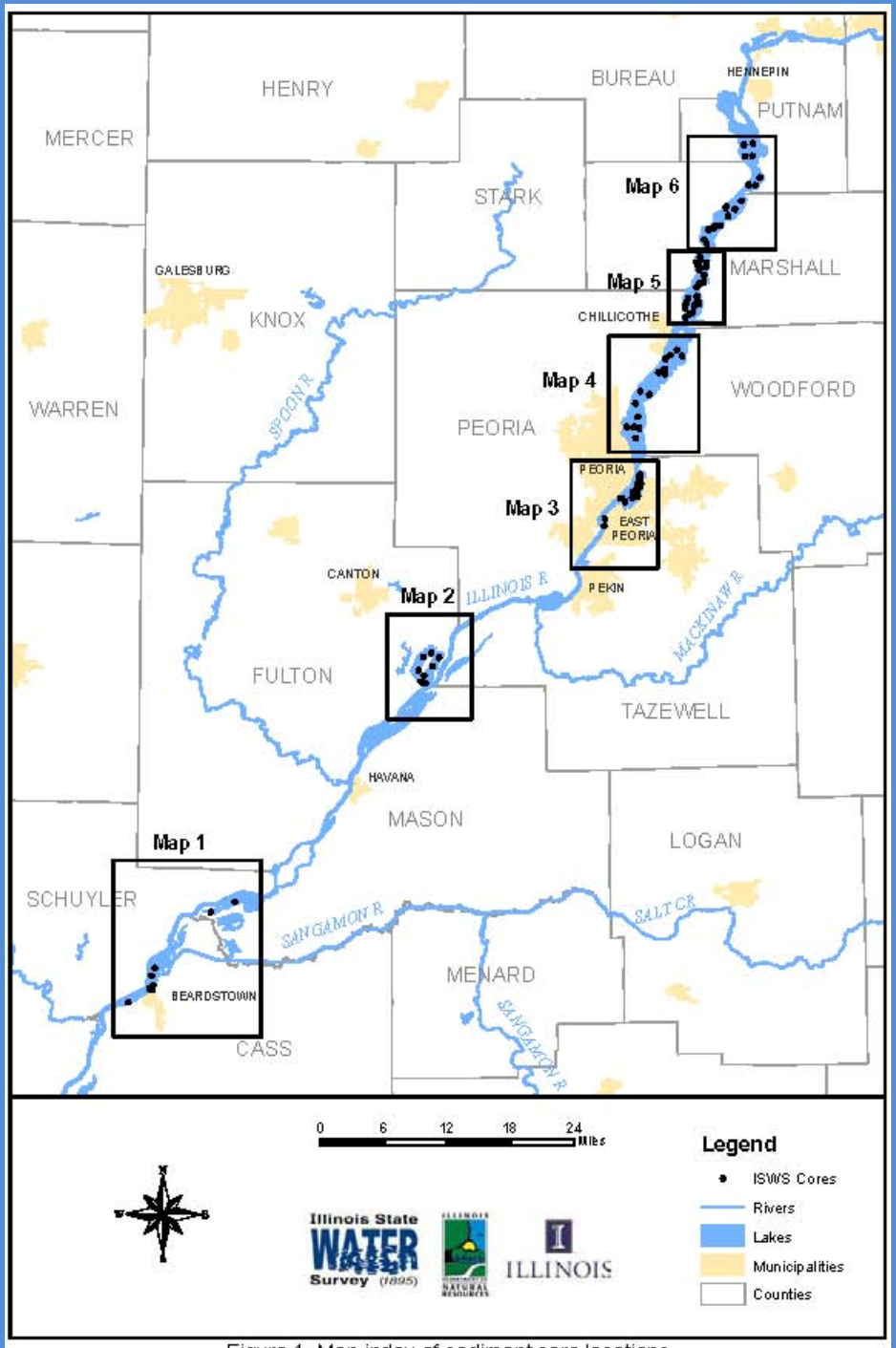
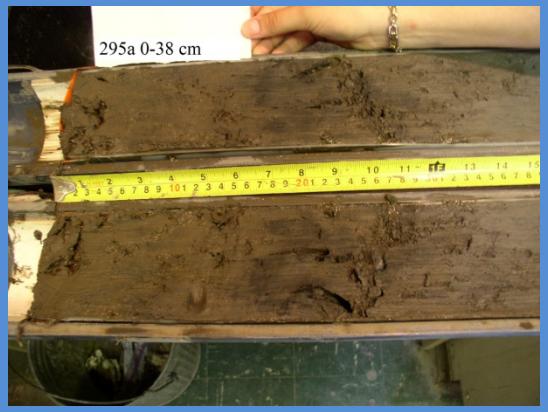


Figure 1. Map index of sediment core locations

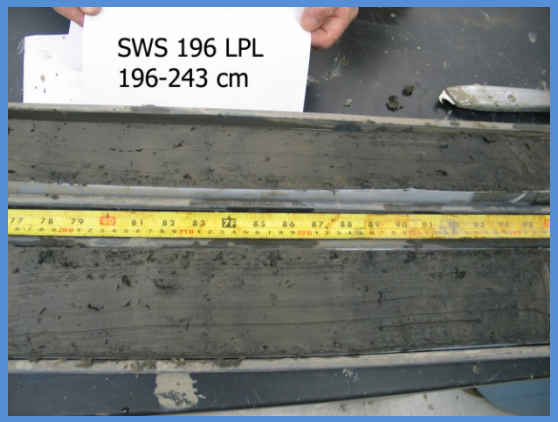
Upper and Lower Segments of Cores in Various Ill River Lakes



Goose Lk.,. Fulton Co.

295a 0-38 cm

295c 50-84 cm



Lower Peoria Lk. Near Channel, River mile 163.5

195a 0-48 cm

195 f 196-243 cm

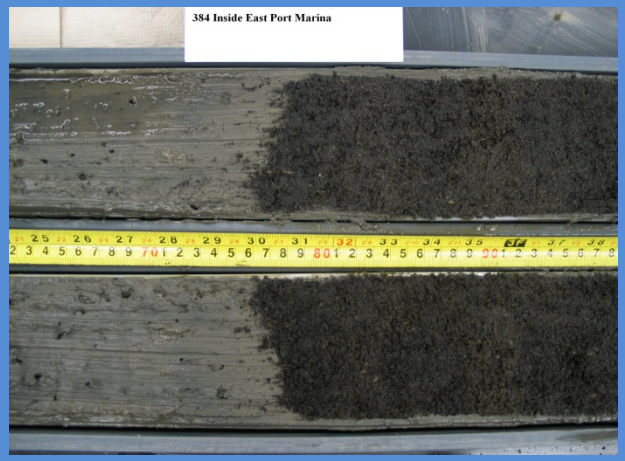
Sawyer Slough (lower end) Marshal Co.

277a 0-36 cm

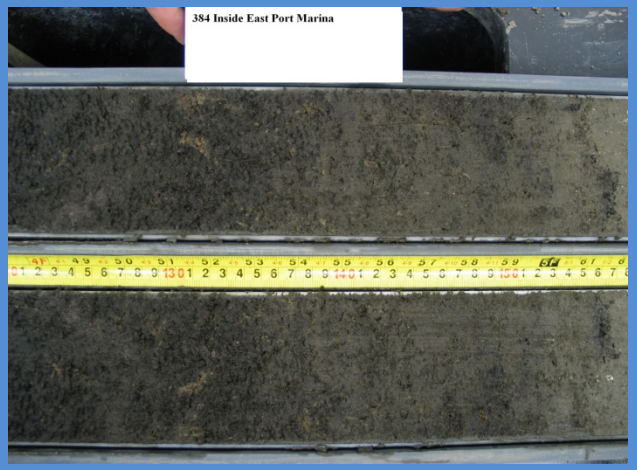
277d 90-122 cm

Six Segments of Core 384 from inside East Port Marina Lower Peoria Lk.

384a 0-34 cm

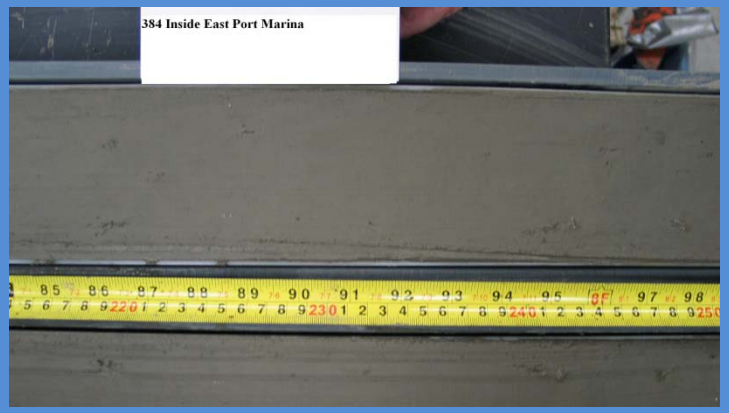


384c 62-97 cm



384e 121-157 cm

384f 156-195 cm



384h 215-249 cm

384j 255-280 cm

Texture and Organic Matter of Sediment along East Port Channel in Lower Peoria Lake at Various Depths

Approximate depth in cm	Core 195 USDA Texture	Core 197 USDA Texture	Core 384 USDA texture
20-40	Silty Clay Loam	Silt Loam	Silty Clay
100-120	Silty Clay Loam	Sandy Loam	Peaty
170-190	Silty Clay Loam	Silty Clay Loam	Clay Loam
250-270	Silty Clay Loam	Silty Clay Loam	Silty Clay

Organic matter content at various depths

Core 195	Core 197	Core 384
Composite 8-260 cm = 4.4%	26-28 cm = 4.6%	10-22 cm = 4.35 %
	66-68 cm = 5.3%	90-52 cm = 49.7 %
	106-108 cm = 3.9%	170-192 cm = 2.79 %
	146-228 cm = 1.9%	210-272 cm = 3.21 %

Selected Physical and Agronomic Properties of Core 279 from Babb's Slough

Depth cm	consistence (feel)	texture (feel)	% sand (feel)	moisture (% wet)	organic matter %	extractable P ppm
6--8				59		
30--32	paste	Silt Loam (peaty)	<1		10	57
46--48				40		
50--52	paste	Silty Clay Loam	12		8	37
86--88				24		
70--92	very friable	Silty Clay	16		3.2	44
150--172	friable	Silty Clay Loam	17		2	14
206--208				18		
210--232	friable	Sandy Loam	80		1	7

Physical and Agronomic Properties of Core 277 from Babb's Slough

Depth cm	consistence (feel)	texture (feel)	% sand (feel)	moisture (% wet)	organic matter %	extractable P ppm
6--8				56		
10--12	fluid	Silty Clay Loam	7		3.8	56
30--32	paste	Silty Clay Loam	5		3.8	56
46--48				33		
50--52	very firm	Silty Clay	5		2.4	23
70--72	firm	Silty Clay	12		2.4	23
86--88				19		
90--92	firm	Clay Loam	40		1	11
110--112	friable	Clay Loam	45		1	11

core 277

Contaminant Testing

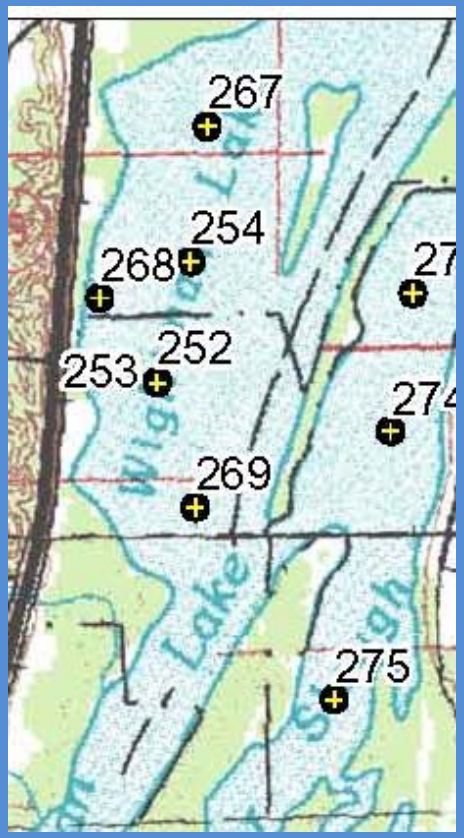
- 24 metals
- 22 pesticides
- 7 PCB arachlors
- 72 semi-volatile organics, including PAH

Concentration of Selected Chemicals in Sediment Cores from Various Backwater Lakes in Illinois (preliminary data)

Chemical	Wightman Lk. Lacon IL. Ill. River N=5	Babb Slough Lacon IL. Ill. River N=7	Lower Peoria Lk. (East Port) Ill. River N=8	Muscootin Bay Beardstown Ill. River N=3	Sturgeon Bay, New Boston IL Miss. River N=5
Arsenic mg/kg	9.6 R 6.4--13	4.9 R 2.9—6.8	7.3 R 5.3—9.6	5.0 R .81—7.6	6.2 R 4.1--8.4
Lead mg/kg	58.6 R 32--84	19.4 R 13--30	42.5 R 29--67	15.6 R 5.7—22	19.8 R 15--24
Zinc mg/kg	246 R 140--320	92.1 R 56--160	192.5 R 130--310	58.7 R 14—85	88 R 68--110
Dieldrin ug/kg	< 22 R --	< 12 R --	< 22 R --	< 2.9 R --	< 6 R --
PCB 1254 ug/kg	55.4 R 22--130	25.9 R 11--59	91 R 32—210	< 28 R --	< 26 R --
BAP ug/kg	762 R 150--2200	104 R 23--430	194 R 60--340	< 56 R --	14.2 R 7.5—26*

N= number of cores, R = range, core length varies from .7 to over 2 meters, * J values

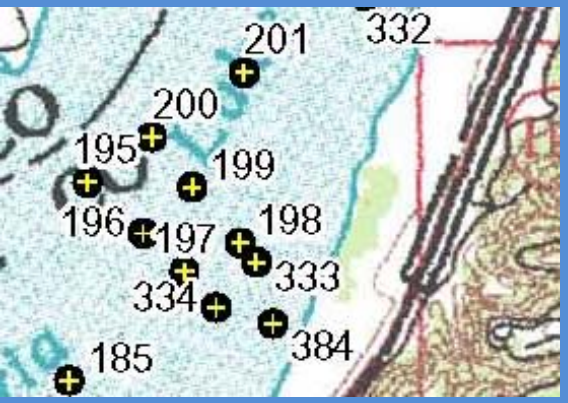
Concentration of Selected Chemicals from Sediment Cores in Wightman Lake near Lacon



ISWS map

Core / Chemical	269 8-250 cm	252 8-250 cm	268 8-246 cm	254 8-190 cm	267 10-112 cm
Arsenic mg/kg	13	12	6.5	10	7.7
Lead mg/kg	84	72	39	66	43
Zinc mg/kg	300	320	190	280	190
Dieldrin ug/kg	<22	<17	<12	<6.6	<4.3
PCB 1254 ug/kg	40	130	37	68	35
BAP ug/kg	2200	550	160	750	240

Concentration of Selected Chemicals in Segments of Sediment Core 197 from East Port Channel, Lower Peoria Lake



ISWS Map

Core/ Chemical	197 8-90 cm	197 108-134 cm	197 148-230cm
Arsenic mg/kg	5.3	2.3	1.7
Lead mg/kg	40	17	8.9
Zinc mg/kg	190	90	41
Dieldrin ug/kg	<16	<3.5	<22
PCB 1254 ug/kg	78	<35	<44
BAP ug/kg	240	72	44

- Sediment has been used as topsoil at several sites in Illinois including a strip mined area, three landfills, and two industrial sites converted to parks. The following slides show the placement of mud from the Illinois River at East Peoria on the Banner Marsh State Fish and Wildlife Area and the Pekin Landfill. Both sites experienced excellent plant growth on the sediment which was easily handled by conventional equipment.

July 22, 2004, Banner Marsh


August 17, 2004, Banner Marsh


March 18, 2005 Banner Marsh

June 22, 2006 Banner Marsh


July 7, 2007 Banner Marsh

Pekin Landfill October 2007

Pekin landfill August 2008 clay liner/sediment cap

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