Data Repository Item 2001068

APPENDIX

Table A. Pollen data from cores WB5, WB8 and WB9 expressed as a percentage relative to the regional pollen sum. Pollen analysis reveals an increase in the agricultural indicators *Rumex* and *Ambrosia* between 80 and 90 cm. This likely represents the initiation of widespread clearance and agriculture around A.D. 1700. A decrease in relative abundance of *Castanea* pollen to less than 1 % above 20 cm is likely associated with the chestnut blight drastically reducing the population of mature chestnut trees between A.D. 1915 and 1920.

Table B. ^{137}Cs data from core WB3 (see Fig. A).

Figure A. WB3 contains a fine sand layer between 19 and 20 cm within salt marsh peat. The activity of ^{137}Cs within the upper 30 cm of core 3 provides stratigraphic markers associated with nuclear weapons testing. The beginning of ^{137}Cs deposition occurred in A.D. 1954 and the maximum took place in A.D. 1963. ^{137}Cs samples were taken at 1 cm intervals and dried for 18 hours at 100^{o}C. The activity of ^{137}Cs was measured using a high-resolution gamma ray spectrascope. The results are reported in picoCuries per gram dry weight of sediment. ^{137}Cs activity was measured under the direction of Dr. H. Jeter of Teledyne Brown Engineering, Westwood, NJ. A peak in ^{137}Cs activity to between 1 and 1.2 pCi/g at 17.5 to 18.5 cm indicates deposition about A.D. 1963. This peak in ^{137}Cs activity constrains the age of the sand layer between 19 and 20 cm to just prior to A.D. 1963.

Figure B. Photograph of sand layer between 40 and 51 cm in core WB3. The rip-up clast, consisting of brown mud with *S. alterniflora* remains, evident at the base of this sand layer (~46-49 cm) indicates a high-energy depositional event. Similar features are apparent at the base of many of the other sand layers recovered in sediment cores.

Figure C. The historical coastal survey chart from 1842 and aerial photographs from the 1930s to 1990s are used to document historic changes in geomorphology, overwash deposition, and beach position at Whale Beach. Aerial photographs and the 1842 chart were digitally scanned and georeferenced with Arc Info Geographic Information Systems software. Shoreline change maps were created by digitizing the outline of the barrier islands, including overwash fans, and overlaying these past shorelines on the 1991 image. Historical analysis of overwash fan deposition and barrier geometry based on aerial photographs (1932, 1951, 1962, and 1991) and a 1842 U.S. coast survey map from Whale Beach shows how the shoreline changed and where and when overwash fans were deposited. The barrier beach has migrated landward about 300 meters at Whale Beach since 1842 A.D. The edge of an overwash fan covered the location of core WB1 in the 1932 aerial photograph and is likely the sand layer preserved between 22 and 40 cm in core WB1 (see Fig. 3) which does not appear to correlate with any other sand layers.

Table A

ample Depth (cm	Picea undiff.	Quercus	Pinus undiff.	Betula	Fraxinus undiff.	Acer undiff.	Carya	Fagus	Alnus undiff.	Ulmus	Liquidambar	Juglans undiff.	Plantago undiff.	Plantago lanceolata	**Ambrosia**	**Rumex**	**Castanea**	Iva undiff.	Poaceae undiff.	Chenopod. undiff.	Asteraceae undiff.	Myrica	Tsuga	Artemisia	Corylus	Tilia	Ind/Unk	Regional Sum
WB CORE 5																												
1.5	0.0	36.5	16.8	10.2	0.0	0.0	0.0	3.0	2.0	2.0	0.0	1.0	0.0	1.0	**10.2**	**1.0**	**0.0**	0.0	12.2	1.0	0.0	4.1	0.0	0.0	0.0	0.0	13.2	98.5
9.5	1.3	28.4	19.5	11.2	0.7	1.3	6.6	1.3	0.7	0.7	0.0	0.0	0.0	0.0	**9.9**	**0.0**	**0.0**	1.3	79.2	1.3	1.3	2.6	0.0	0.0	0.0	0.0	16.5	151.5
19.5	2.7	38.9	21.6	5.4	1.1	1.1	2.2	2.2	4.3	0.0	1.1	0.0	0.0	0.0	**5.4**	**0.0**	**0.0**	6.5	59.5	6.5	6.5	2.2	2.2	0.0	0.0	0.0	21.6	92.5
25.0	0.0	25.4	16.9	8.5	0.0	0.0	1.7	1.7	1.7	0.0	0.0	1.7	0.0	0.0	**25.4**	**3.4**	**6.8**	0.0	15.3	0.0	0.0	3.4	3.4	0.0	0.0	0.0	22.0	59.0
30.0	0.0	23.3	15.3	9.8	0.0	1.2	6.1	1.2	3.7	0.0	0.0	1.2	0.0	0.0	**30.7**	**0.0**	**1.2**	0.0	22.1	72.4	0.0	2.5	0.0	0.0	0.0	0.0	35.6	81.5
37.0	2.0	24.0	18.0	1.3	0.0	0.7	4.7	0.0	0.7	1.3	0.0	0.0	0.0	1.3	**22.0**	**0.0**	**14.0**	3.3	15.3	14.7	4.7	0.7	4.0	0.0	0.7	0.0	18.0	150.0
41.5	0.3	34.1	26.5	3.5	0.0	0.0	2.1	0.0	0.0	0.0	0.0	0.7	0.0	0.0	**16.0**	**0.7**	**1.4**	8.4	25.8	6.3	6.3	0.7	4.2	0.0	0.0	0.0	16.0	143.5
43.5	1.3	34.6	23.7	2.6	0.0	0.0	2.6	1.3	0.0	0.0	0.0	0.0	0.0	1.3	**29.5**	**0.0**	**1.3**	0.0	28.2	11.5	0.0	0.0	0.6	1.3	1.3	0.0	32.1	78.0
44.7	1.1	32.2	25.3	4.6	0.0	0.0	1.1	3.4	0.0	2.3	0.0	1.1	0.0	0.0	**16.1**	**3.4**	**2.3**	0.0	9.2	10.3	0.0	0.0	1.1	0.0	1.1	0.0	21.8	87.0
46.2	1.8	42.4	17.0	6.1	0.0	0.0	0.0	1.2	1.2	1.2	0.0	0.0	0.0	0.0	**21.8**	**2.4**	**0.0**	0.0	6.1	9.7	0.0	1.2	0.0	0.0	0.0	0.0	23.0	82.5
48.5	4.7	30.6	25.9	3.5	0.0	1.2	3.5	0.0	2.4	0.0	0.0	0.0	0.0	0.0	**15.3**	**2.4**	**1.2**	0.0	11.8	4.7	0.0	0.0	1.2	0.0	1.2	0.0	12.9	85.0
54.5	2.6	32.1	30.1	5.1	0.0	0.0	2.6	1.3	0.0	0.0	0.0	0.0	0.0	1.3	**7.7**	**2.6**	**5.1**	0.0	15.4	6.4	7.7	2.6	3.2	0.0	0.0	0.0	28.2	78.0
59.5	4.3	31.8	31.0	7.4	0.0	0.6	1.1	0.0	2.3	0.0	0.6	0.0	0.0	0.0	**8.5**	**2.3**	**4.0**	0.0	18.8	2.8	0.0	0.6	1.7	0.0	0.0	0.0	21.0	176.0
64.5	3.9	22.2	30.6	5.6	0.0	1.1	8.9	2.2	2.2	0.0	4.4	0.0	0.0	1.1	**10.0**	**0.0**	**2.2**	0.0	17.8	2.2	0.0	1.1	2.2	0.0	0.0	1.1	34.4	90.0
69.5	5.0	45.3	25.8	2.5	0.0	0.0	0.0	1.3	5.0	1.3	0.0	0.0	0.0	0.0	**6.3**	**1.3**	**2.5**	0.0	41.5	5.0	0.0	0.0	1.3	0.0	0.0	0.0	25.2	79.5
75.0	3.4	37.1	31.9	4.3	0.0	0.0	3.4	0.0	3.4	0.0	0.0	0.9	0.0	0.0	**10.3**	**1.7**	**2.6**	0.0	9.5	3.4	0.0	0.0	0.9	0.0	0.0	0.0	4.3	116.0
85.0	2.5	48.1	28.1	2.7	0.0	0.5	1.1	2.7	0.5	0.0	0.0	0.5	0.0	0.0	**4.9**	**1.6**	**0.5**	0.0	12.6	0.5	0.0	0.0	2.2	0.0	0.0	0.0	13.1	183.0
95.0	1.0	43.3	44.3	4.1	0.0	0.0	3.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**2.1**	**0.0**	**0.0**	0.0	13.4	4.1	0.0	0.0	1.0	0.0	0.0	0.0	5.2	97.0
104.5	5.1	38.6	29.3	9.1	0.0	0.0	3.4	0.0	2.3	0.6	0.0	0.0	0.0	0.0	**3.4**	**0.0**	**2.8**	0.0	22.2	1.7	0.0	0.6	2.6	0.0	0.0	0.0	23.3	176.0
125.0	0.9	50.5	34.9	4.6	0.0	0.0	0.0	0.9	1.8	0.0	0.0	0.9	0.0	0.0	**2.8**	**0.0**	**0.9**	0.0	11.0	0.0	0.0	0.9	0.9	0.0	0.0	0.0	13.8	109.0
149.5	6.4	37.4	20.2	12.8	1.0	2.0	2.0	0.0	2.0	0.0	0.0	0.0	0.0	0.0	**2.0**	**0.0**	**2.0**	0.0	21.7	0.0	0.0	3.0	4.9	1.0	0.0	0.0	29.6	101.5
WB CORE 8																												
75.5	1.3	44.5	31.6	5.0	5.0	1.0	2.7	1.0	2.3	0.3	1.7	0.3	0.7	0.0	**16.3**	**2.0**	**2.0**	2.0	18.9	7.0	1.3	0.7	0.3	0.3	0.0	0.0	4.7	301.0
82.5	2.2	44.9	31.3	6.6	2.9	0.7	2.9	1.5	2.2	0.0	1.1	1.1	0.0	0.0	**11.0**	**1.1**	**1.5**	1.5	12.9	2.6	1.9	0.4	0.7	0.4	0.0	0.0	3.3	272.0
90.5	3.0	48.8	32.3	5.5	0.0	0.0	3.0	1.5	2.0	0.0	1.0	0.0	0.0	0.0	**6.0**	**0.0**	**2.5**	3.0	13.9	4.5	1.0	0.0	0.5	0.0	0.0	0.0	4.0	201.0
WB CORE 9																												
13.5	3.5	47.8	27.0	3.5	1.7	0.0	2.6	1.7	2.6	0.9	2.6	0.9	0.0	1.7	**23.5**	**1.7**	**0.9**	7.0	147.0	6.1	3.5	3.5	0.0	0.9	0.0	0.0	7.8	115.0
16.5	2.8	38.5	24.8	9.2	2.8	0.0	4.6	3.7	1.8	0.9	0.9	0.9	0.9	0.0	**26.6**	**2.8**	**0.0**	1.8	78.0	4.6	6.4	7.3	1.8	2.8	0.0	0.0	5.5	109.0
20.5	2.9	36.2	39.0	11.4	1.9	0.0	1.0	0.0	0.0	1.9	0.0	1.0	1.9	1.0	**24.8**	**1.9**	**0.0**	6.7	125.7	5.7	0.0	1.9	0.0	1.0	0.0	1.9	7.6	105.0
23.5	3.5	36.5	22.6	13.9	3.5	1.7	0.9	2.6	4.3	1.7	2.6	0.0	0.9	2.6	**20.9**	**5.2**	**0.9**	2.6	101.7	7.0	5.2	5.2	0.0	0.0	0.0	0.0	7.0	115.0
26.5	2.7	35.4	24.5	16.3	3.1	0.4	1.9	0.4	2.3	1.6	4.3	0.4	1.2	1.6	**52.5**	**1.6**	**0.0**	5.8	58.8	9.3	3.1	6.6	0.0	0.0	0.0	0.0	5.1	257.0
28.0	1.1	35.4	21.0	17.3	4.1	1.1	3.0	2.6	3.3	2.6	3.0	1.5	1.1	0.7	**46.9**	**2.6**	**1.1**	5.9	64.6	12.2	1.8	3.0	0.0	0.4	0.0	0.0	1.8	271.0
29.5	1.0	38.3	23.4	13.9	3.4	0.3	2.4	1.0	3.4	1.7	3.7	1.0	1.7	3.4	**52.5**	**2.4**	**1.4**	3.4	73.2	11.9	0.7	4.1	0.7	0.7	0.0	0.0	3.4	295.0
32.5	3.2	28.4	26.1	13.3	5.5	1.4	4.1	2.3	3.2	0.5	3.7	0.5	1.4	5.0	**55.0**	**2.3**	**2.8**	4.1	70.6	9.2	2.3	5.0	0.0	1.4	0.0	0.0	4.1	218.0
35.5	3.2	36.0	26.3	9.7	2.6	0.6	1.0	1.0	3.6	1.3	5.5	0.6	1.3	1.6	**31.2**	**1.9**	**3.2**	2.9	84.7	17.9	3.2	5.2	0.0	0.6	0.0	0.0	4.5	308.0
64.0	0.0	36.0	40.4	3.5	2.6	0.9	2.6	0.0	2.6	1.8	3.5	0.0	0.0	0.0	**21.1**	**1.8**	**0.9**	0.9	7.0	6.1	0.0	3.5	0.9	0.0	0.0	0.9	3.5	114.0
79.0	2.6	42.6	30.0	7.1	2.3	1.3	2.3	1.3	3.2	1.0	3.2	0.3	0.0	0.0	**20.0**	**1.3**	**1.6**	2.6	23.2	14.5	1.3	0.6	0.6	0.0	0.0	0.0	4.2	310.0
90.5	1.3	43.8	33.2	4.9	3.6	0.0	3.3	1.0	2.0	0.0	1.0	0.3	0.3	0.0	**13.5**	**0.0**	**2.0**	1.0	16.1	3.3	1.0	2.0	1.0	0.7	0.0	0.7	2.0	304.0

Table B

Sample Depth (cm)	Cs-137 activity (pCi/g)	analytical uncertianty
WB CORE 3		
3.5	0.3	0.1
6.5	0.1	0.1
9.5	0.1	0.1
10.5	0.2	0.1
11.5	0.2	0.1
12.5	0.4	0.1
13.5	0.3	0.1
14.5	0.4	0.1
15.5	0.4	0.1
16.5	0.6	0.0
17.5	1.1	0.1
18.5	1.1	0.1
19.5	0.5	0.1
20.5	0.6	0.1
23.5	0.3	0.1
24.5	0.2	0.1
26.5	0.0	0.1

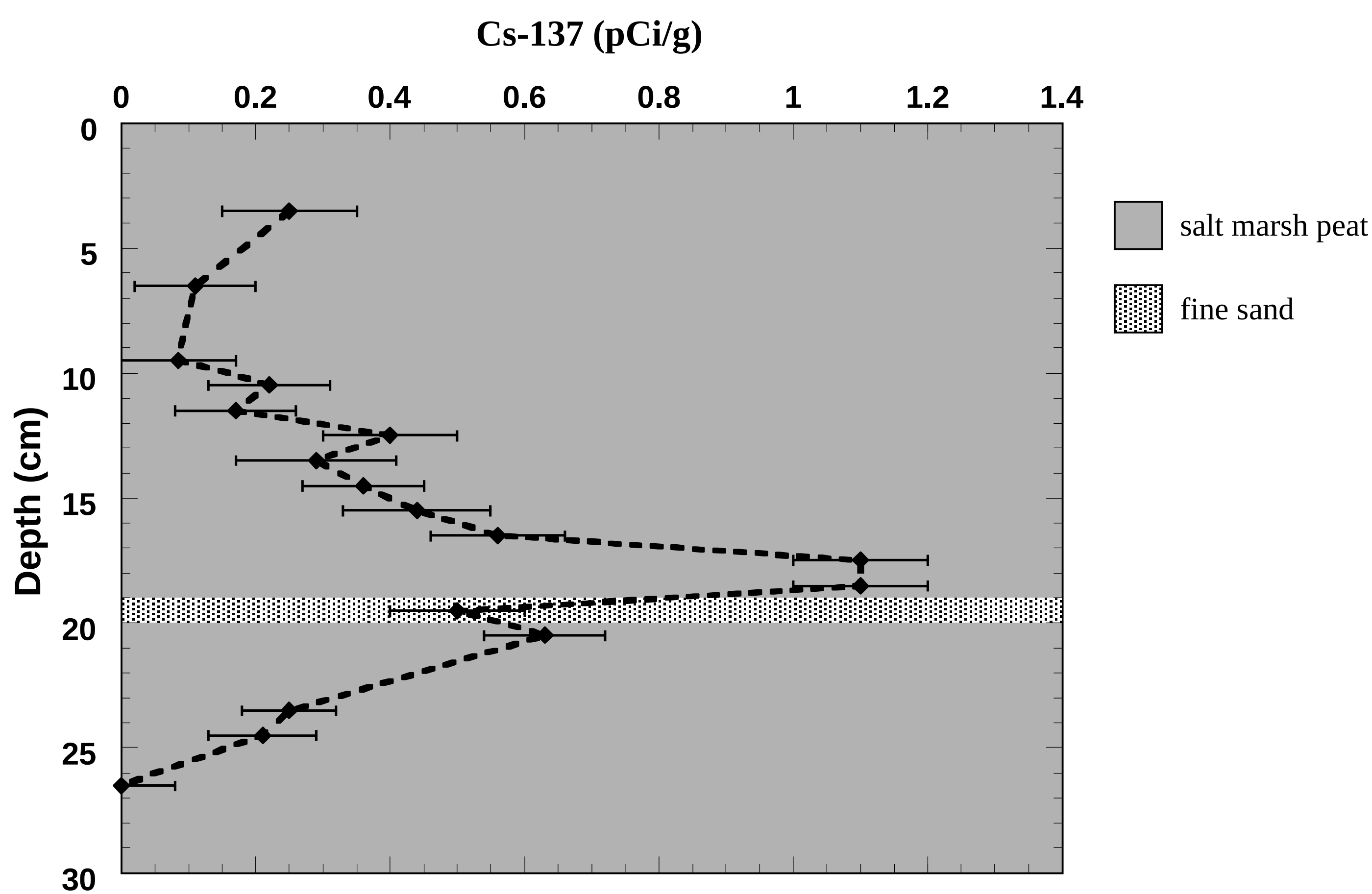
Cs-137 (pCi/g)
0
0.2
0.4
0.6
0.8
1
1.2
1.4
Depth (cm)
0
5
10
15
20
25
30
salt marsh peat
fine sand

Figure A

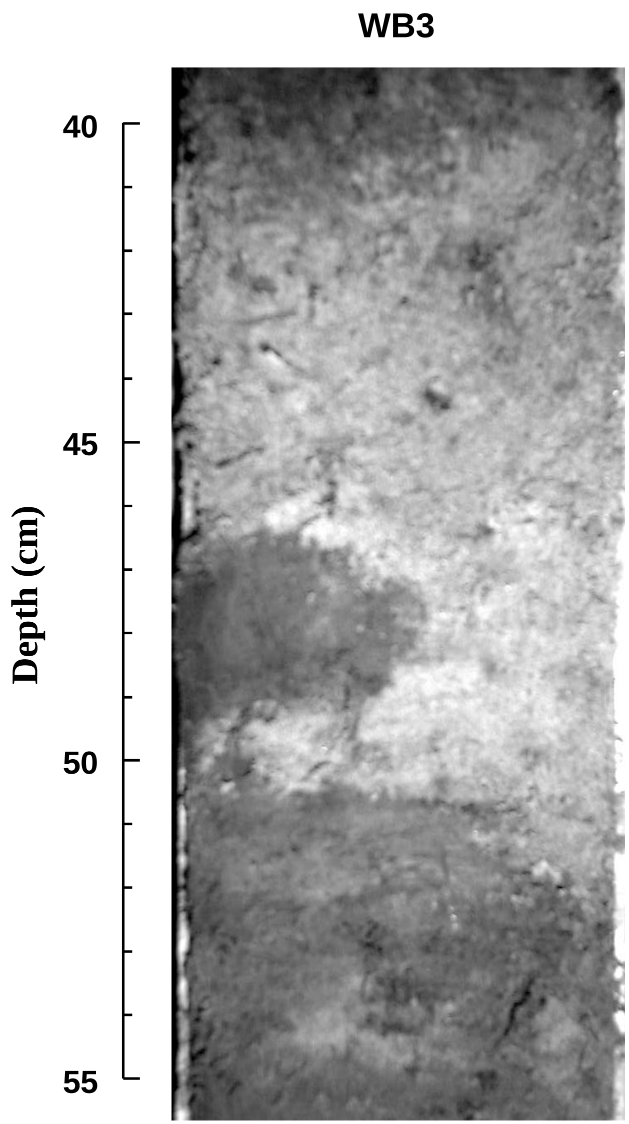

Figure B

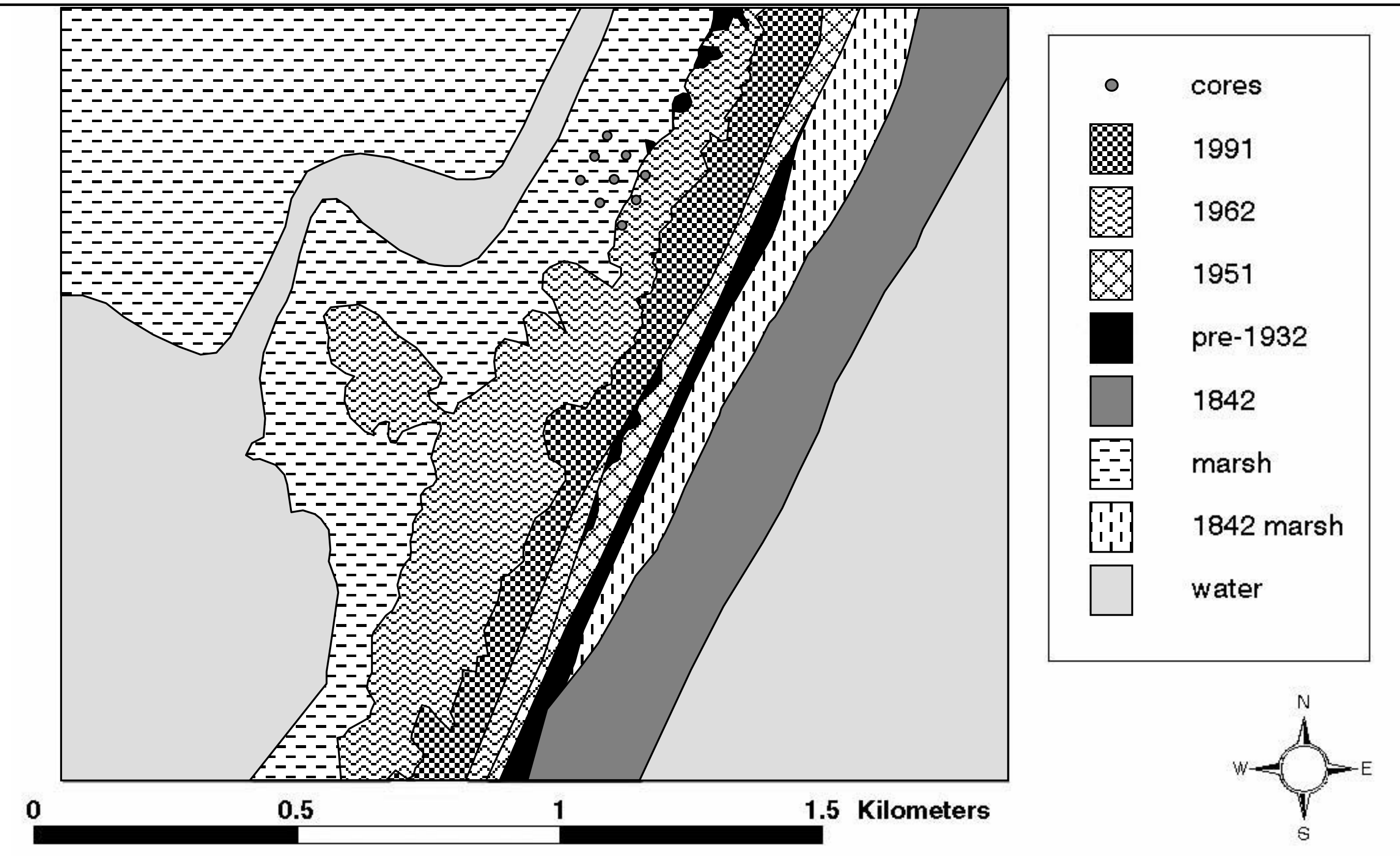
cores
1991
1962
1951
pre-1932
1842
marsh
1842 marsh
water
0
0.5
1
1.5 Kilometers
N
W
E
S

Figure C