Special Publication SJ95-SP3

Historical Sedimentation and Nutrient Storage Rates in the Blue Cypress Marsh Conservation Area

Final Report

for

St. Johns River Water Management District

by

Mark Brenner

Claire L. Schelske

Department of Fisheries and Aquatic Sciences

University of Florida

7922 NW 71st Street

Gainesville, FL 32653

March 1995

Special Publication SJ95-SP3

Historical Sedimentation and Nutrient Storage Rates in the Blue Cypress Marsh Conservation Area

Final Report

for

St. Johns River Water Management District

by

Mark Brenner

Claire L. Schelske

Department of Fisheries and Aquatic Sciences

University of Florida

7922 NW 71st Street

Gainesville, FL 32653

March 1995

Table of Contents

Maps, Tables and Figures

Page

Page

Page

Page

Page

Executive Summary

Sixteen sediment/water interface cores from the area in and around the Blue Cypress Marsh Conservation Area, Upper St. Johns River Basin, were studied to assess the recent environmental history of the region. The cores ranged in total length from 60 to 96 cm. The sediment profiles were used to measure recent rates of bulk sediment accumulation, nutrient (C, N, P) sequestering rates, rates of mercury deposition and recent changes in the marsh flora. In Phase I of the study, duplicate cores from three sites in the Blue Cypress Marsh were studied to evaluate the feasibility of using ^{210}Pb dating methods to determine age/depth relationships in marsh sediments and to establish the replicability of physical, chemical and isotopic (^{210}Pb, ^{226}Ra, ^{137}Cs) stratigraphies. After it was established that cores could be successfully dated using ^{210}Pb techniques, nine additional marsh cores and a single profile from Blue Cypress Lake were studied in Phase II of the project to expand the geographic scope of the investigation.

Isotopic activities in fifteen marsh cores and the profile from Blue Cypress Lake were analyzed by gamma spectroscopy, permitting simultaneous measurement of ^{210}Pb, ^{226}Ra, and ^{137}Cs activities. Ten marsh cores and the lake section were fully dated using the constant rate of supply (c.r.s.) ^{210}Pb dating model. Supported ^{210}Pb (^{226}Ra) activities in the wetland sediments are low, generally <1 dpm g^{-1}, indicating that Blue Cypress Marsh sediments can be successfully dated by either alpha or gamma spectroscopy. Blue Cypress Lake sediments, on the other hand, contained higher and more variable ^{226}Ra activity and must be dated by gamma counting.

^{137}Cs failed to provide a reliable, independent dating marker in this study. The anthropogenic radioisotope did not display a clearly defined activity peak in the cores. In some studies, the peak has been used to identify the period of maximum atmospheric fallout ca. 1963. ^{137}Cs activity was detected in sediments throughout the profiles, including at depths that were shown by ^{210}Pb dating to be considerably more than 30 years old (i.e. deposited decades before the 1963 fallout maximum). Highly soluble cesium probably moves through the organic-rich sediment columns in downward percolating interstitial waters. The isotope may also be mobilized

by plant uptake and transport. Because ^{137}Cs fails to display a distinctive 1963 activity peak, depths at which higher ^{137}Cs activities were detected can only be used in a general way to support ^{210}Pb dates.

Sediment cores from Blue Cypress Marsh all demonstrate fairly consistent stratigraphies with respect to physical and chemical characteristics. In all marsh areas covered by water, sediment percent dry weight and bulk density (g dry cm^{-3} wet) increased with greater depth in cores. This trend was especially pronounced near the top of sections and is attributed to compaction and dewatering of deeper deposits. At one site, where the water table was about 12 cm below the land surface, this trend was not encountered. Desiccated uppermost deposits displayed higher percent dry weight and bulk density.

Blue Cypress Marsh sediments are organic-rich over their entire lengths and generally possess >90% organic matter by weight. Total carbon, bound almost exclusively in organic form, typically represents >50% of the sediment dry weight. Nitrogen concentration in the wetland sediments generally exceeds 3% of dry weight. There are no strong trends with respect to organic matter, carbon, and nitrogen concentrations versus depth in the sediment profiles. Total phosphorus consistently displays a concentration gradient with depth in the cores. Total P content is very low near the base of the sections and increases toward the top of profiles. Recent increases in total P loading to the Blue Cypress Marsh may account for the stratigraphic distribution of the nutrient in marsh sediments. Nevertheless, very high phosphorus concentrations in uppermost deposits may, in part, reflect growth of P-rich benthic algae on the sediment surface. Higher P content in recent deposits may also be attributable to post-depositional movement of P in sediments. Fractionation studies, designed to identify how phosphorus is bound in marsh deposits, may rule out this latter hypothesis.

Linear sedimentation rates in the Blue Cypress Marsh averaged 0.34 ± 0.6 cm yr^{-1} since the turn of the century (n = 10 ^{210}Pb-dated marsh cores). All dated sites displayed increased mass sediment accumulation (mg cm^{-2} yr^{-1}) through time. Very recent accumulation rates are typically the highest recorded values and the trend toward greater mass sediment accumulation suggests increased organic matter production (i.e. higher productivity) in recent years. Nevertheless, high recent accumulation rates of organic-rich sediment may simply reflect insufficient time for diagenetic breakdown of these young deposits. During the last decade, bulk sediment accumulation at the ten marsh sites and one lake site averaged 46 ± 13 mg cm^{-2} yr^{-1} (range 27-67 mg cm^{-2} yr^{-1}).

The eleven fully dated cores all show increased total phosphorus accumulation over time. Higher computed P accumulation rates in recent years are a consequence of the combined effects of more rapid bulk sediment accumulation and greater concentrations of total P in topmost deposits. For the ten marsh sites with dated cores, the mean rate of phosphorus accumulation since the 1970s has been 2.3 to 17.0 times higher than the rate recorded for the period around 1920. In Blue Cypress Lake, the total P accumulation rate since the 1970s was 2.3 times higher than the rate recorded for 1920. Recent apparent increases in P accumulation rate are probably attributable to higher recent P loading of the marsh. Nevertheless, factors that affect P concentration in the sediment column (e.g. post-depositional P transport or diagenesis) can, in turn, influence calculated P accumulation rates.

Mercury content was measured in cores from two sites (1B and 3B) in the Blue Cypress Marsh. Mercury profiles show gradients in which Hg concentrations are generally higher in recent sediments as compared with older, deeper deposits. Topmost deposits at sites 1B and 3B contain 129 and 393 ng Hg g^{-1} dry, respectively. At site 1B, mercury has accumulated four times faster since 1985 (3.5 ng cm^{-2} yr^{-1}) than it did at the turn of the century (0.88 ng cm^{-2} yr^{-1}). At site 3B, the post-1985 rate of Hg deposition (9.1 ng cm^{-2} yr^{-1}) was about 5-fold higher than the estimate for 1900 (1.75 ng cm^{-2} yr^{-1}).

Pollen counts were done at selected levels in Blue Cypress Marsh cores 1B and 3B. Dominant terrestrial pollen types encountered in the marsh deposits included pine, wax myrtle, white cedar, grasses, Cheno-Ams, composites, and sedges. Principal aquatic taxa represented in the pollen record include cattails, water lilies and arrowhead. About mid-depth in the profiles there is a shift from dominance of Cheno-Ams to greater representation of wax myrtle and an increase in water lily pollen. The change suggests deepening and freshening of water in the wetland. Presence of pollen of hydrophilic cypress and buttonbush in topmost deposits supports this interpretation. Cattail pollen is only represented in sediments deposited during the last four decades and sawgrass pollen appears in the record even later, showing up at site 3B only in the late 1970s. The pollen record provides no evidence that *Typha* is replacing *Cladium* near these core sites. Nevertheless, these marsh plants generally propagate vegetatively and the pollen record they leave may not be an accurate indicator of plant abundance if these taxa do not produce large amounts of pollen.

In conclusion, paleolimnological methods were used in and near the Blue Cypress Marsh Conservation Area, Upper St. Johns River Basin, to evaluate the ecological history of the aquatic ecosystem. Marsh and lake sediments preserve a record of the historical ecology of the ecosystem and that history was interpreted by stratigraphic study of sediment profiles. ^{210}Pb dating of marsh and lake sediment cores provided reliable chronologies that were used to determine nutrient (C,N,P) and heavy metal (Hg) accumulation rates as well as the timing of major shifts in marsh flora.

Introduction

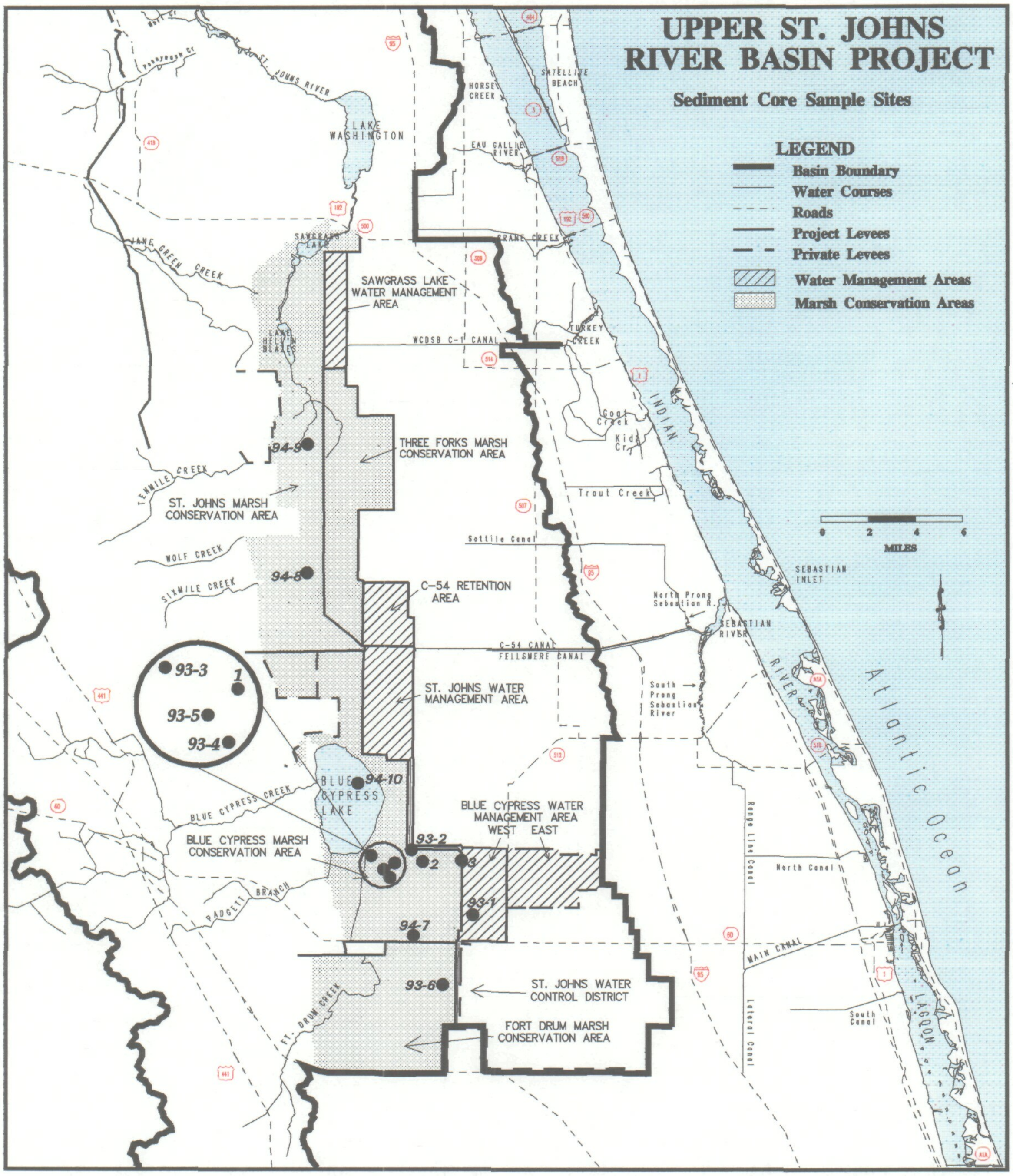
Marsh sediments preserve long-term records of environmental changes in wetland ecosystems. Valuable paleoenvironmental information can be extracted from wetland sediment stratigraphies using techniques borrowed from paleolimnology. Paleoenvironmental studies provide a long-term perspective on ecosystem perturbations, allowing comparison of conditions in modern, disturbed ecosystems with predisturbance, baseline conditions. Information that can be gleaned from the sediment record includes the history of wetland vegetation, past rates of nutrient input and storage in the ecosystem, and regional rates of heavy metal deposition.

We used sixteen sediment profiles from the Upper St. Johns River Basin, Florida to study the historical ecology of this vast marsh ecosystem (Map 1). Initially, six cores were studied to assess the feasibility of dating the deposits with ^{210}Pb and ^{137}Cs, and to evaluate the possibility of reconstructing historical nutrient burial rates. The six cores were analyzed at high sampling resolution, i.e. 2-cm intervals, for radionuclides (^{210}Pb, ^{214}Bi, ^{137}Cs) and assessed for sediment density (g dry cm^{-3} wet), percent organic matter (% weight loss on ignition [LOI]), total carbon, nitrogen and phosphorus. Additionally, pollen analysis was completed on two cores to reconstruct recent changes in marsh vegetation. Mercury concentrations were measured in two of the sediment profiles to evaluate historical Hg accumulation rates at two sites.

Once it was established that marsh cores could be reliably dated using ^{210}Pb techniques, an additional ten cores were collected (nine within the marsh ecosystem and one from Blue Cypress Lake) to expand the geographic scope of the study. These cores were sampled at 4-cm intervals and were used principally to evaluate stratigraphic variation in nutrient concentrations and changes in carbon, nitrogen and phosphorus sequestering rates during the last century.

Site Description

The Blue Cypress Marsh Conservation Area (BCMCA), Indian River County, Florida was the principal area of interest for this study, with eleven of sixteen sediment cores collected within the BCMCA. Two profiles were collected in the Fort Drum Marsh Conservation Area (FDMCA)


UPPER ST. JOHNS
RIVER BASIN PROJECT
Sediment Core Sample Sites
LEGEND
Basin Boundary
Water Courses
Roads
Project Levees
Private Levees
Water Management Areas
Marsh Conservation Areas
MILES
LAKE WASHINGTON
SAWGRASS LAKE WATER MANAGEMENT AREA
THREE FORKS MARSH CONSERVATION AREA
ST. JOHNS MARSH CONSERVATION AREA
C-54 RETENTION AREA
ST. JOHNS WATER MANAGEMENT AREA
BLUE CYPRESS WATER MANAGEMENT AREA
WEST EAST
BLUE CYPRESS MARSH CONSERVATION AREA
BLUE CYPRESS LAKE
ST. JOHNS WATER CONTROL DISTRICT
FORT DRUM MARSH CONSERVATION AREA
WCDSB C-1 CANAL
C-54 CANAL
FELLSMERE CANAL
Sottile Canal
Trout Creek
SEBASTIAN INLET
SEBASTIAN RIVER
INDIAN RIVER LAGOON
Atlantic Ocean
94-9
94-8
93-3
1
93-5
93-4
94-10
93-2
2
3
93-1
94-7
93-6

to the south, and two were taken in the St Johns Marsh Conservation Area (SJMCA), to the north, in Brevard County. A single core was collected in Blue Cypress Lake, Indian River County.

The study region lies in the upper reaches of the St. Johns River basin. Together with several other water management and conservation areas that extend southward to the St. Lucie County border and northward into neighboring Brevard County, these large wetlands constitute part of the upper St. Johns River Basin Project. Management of the region became necessary because the vast floodplain marsh has been subjected to increasing anthropogenic influence throughout this century. Regional hydrology was deliberately altered by the construction of levees, canals and water control structures (e.g. weirs, culverts and spillways). Road construction, particularly east-west routes, impeded south-to-north sheet flow of surface waters. Both lacustrine and wetland ecosystems in the region have probably been influenced by inputs from nutrient-rich agricultural runoff. Nutrient enrichment may also occur via delivery of airborne particulates blown from the surface of nearby agricultural fields.

This paleoenvironmental study was designed to evaluate whether hydrologic modification and presumed recent increases in nutrient loading of the marsh could be documented by study of marsh sediment records. We also sought to discover whether changes in long-term nutrient accumulation in the marsh may have affected the wetland flora. Finally, we hoped to evaluate whether mercury input to the marsh has increased in recent years and whether rates of Hg deposition are comparable to values measured at other wetland sites in Florida.

Sample site selection was based largely on two goals. The first goal was to compare historical changes in nutrient accumulation rates in sediments along a nutrient gradient extending from a high-nutrient discharge point. The second goal was to compare historic nutrient accumulation rates in similar communities from different regions of the basin.

High historical nutrient discharges were released to the marsh near site 3. Sites 3, 2, 93-2, 1, and 93-3 were located at increasing distance from the old point of nutrient input (Map 1). Sites 93-5 and 93-4 were placed perpendicular to the expected discharge flow and progressively upstream from the expected natural sheetflow. The other sample sites were placed throughout the basin to characterize large-scale horizontal variation. These latter sites were located far from nutrient inputs, in areas with little apparent nutrient impact. Sediment cores were collected in sparse vegetation to reduce the proportion of living root material in the upper core.

Field Methods

In the initial, feasibility phase (Phase I) of this study, six sediment/water interface cores were collected from the Blue Cypress Marsh Conservation Area on 23 September 1992. Three sites along a southwest-northeast transect were selected for sediment coring (Table 1). Duplicate cores were obtained about 50 m apart at each of the three sites, and latitude/longitude readings at each coring location were determined with a Global Positioning System (GPS). The coring sites were simply assigned site numbers 1, 2, and 3 and duplicate cores were designated cores A and B. All three sites lie north of state road 60 and west of road 512. The most southwesterly station (Site 1) is farthest from roadway 512, levee L-77 and weir S-254. It is presumably the least disturbed of the sites. Site 3, the most northeasterly station is closest to the roadway and weir and was assumed to display the greatest impacts from disturbance. The three sites were accessed by St. Johns River Water Management District (SJRWMD) airboats. In addition to the airboat drivers, field personnel included L. Keenan & A. Keller (SJRWMD) and M. Brenner & A. Peplow, University of Florida (UF).

In Phase II of the project, a total of ten more cores were collected for analysis. Six cores were collected on 2 December 1993 and an additional three cores were collected on 21 January 1994. Cores were collected from the Blue Cypress Marsh Conservation Area, the Fort Drum Marsh Conservation Area, and the St. Johns Marsh Conservation Area, thereby extending the geographic scope of the study. Airboats were used to access all coring sites and a single core was collected at each location. Field personnel involved in core collection during this phase included L. Keenan & K. Snyder (SJRWMD) and M. Brenner & J. Curtis (UF). A final core was collected from Blue Cypress Lake on 8 February 1994. L. Keenan (SJRWMD), M. Brenner & J. Kahne (UF) constituted the coring team. Latitude/longitude coordinates were recorded at all marsh sites (Table 1) and the lake core was collected in about 3 m of water from the east-central part of the basin. All cores in the second phase of the study were assigned core codes based on the date (day-month-year) and order in which they were collected. For instance, core 2-XII-93-4 was the fourth sediment section collected in Phase II and was taken on 2 December 1993.

Cores were retrieved using a piston corer with a 7.6-cm diameter, clear polycarbonate core barrel (Fisher et al. 1992). The corer was originally designed to be pushed into soft, poorly consolidated lake sediments and was used in the normal fashion to sample Blue Cypress Lake deposits. Marsh sediments are dense peats that required special modification of the corer. The coring "head" was fitted with a PVC cap through which the piston cable passed. This cap served as a hammering surface and the core barrel was driven into the firm, peaty sediments with a rubber mallet. Core locations and total core lengths are presented in Table 1.

Core tubes were plugged top and bottom with #13 1/2 rubber stoppers on retrieval, and the clear plastic core barrels were labelled and photographed on site. Photographic slides of all retrieved cores were sent to the St. Johns River Water Management District for archival purposes. Following collection of cores from the marsh, sediment-filled coring tubes were strapped in a vertical position on the airboat to minimize disturbance. Marsh cores were stored upright, in a light-proof plywood box for transport to Gainesville. The samples were kept at 4°C in a walk-in refrigerator at the Department of Fisheries and Aquatic Sciences, UF for 24-48 hours prior to extrusion. The core from Blue Cypress Lake (core 8-II-94-10) possessed unconsolidated lacustrine deposits and the profile was sampled at 4-cm intervals on the lake shore to prevent sediment mixing that might otherwise have occurred during transport to the laboratory. The top of the core barrel was fitted with a specially-designed PVC tray (Fisher et al. 1992) and the core sections were extruded upward into the sampling tray. During extrusion of the lake core, sediment sections along with associated interstitial water were transferred to labelled 18-oz. Whirl-Pak™ bags that were in turn placed in larger, labelled zip-lock bags. The bagged sediment samples were placed on ice in a portable cooler for transport to the laboratory where they were stored in a walk-in refrigerator at 4°C prior to drying and processing.

Laboratory Methods

All cores were extruded and sampled within two days of collection. Core tubes were maintained in a vertical position and sediments were removed by pushing upward on the base of the sediment column with a tight-fitting, extruder piston. Samples were extruded into the PVC collecting tray mounted on the top of the core tube (Fisher et al. 1992). Cores 1A, 1B, 2A, 2B, 3A and 3B were sectioned at 2-cm intervals. All cores in Phase II were sectioned at 4-cm intervals. Sediment and associated interstitial water from each section were stored in labelled, 18-oz. Whirl-Pak™ bags and refrigerated at 4°C prior to processing.

Table 1. Blue Cypress Marsh coring locations and sediment core lengths.

Site/Core	Latitude (N)	Longitude (W)	Total length (cm)
1A	27°41'38.3"	80°43'28.6"	70
1B	27°41'38.3"	80°43'28.6"	89
2A	27°41'43.6"	80°42'12.8"	80
2B	27°41'43.6"	80°42'12.8"	90
3A	27°41'47.9"	80°40'51.6"	72
3B	27°41'47.9"	80°40'51.6"	86
2-XII-93-1	27°39'24.2"	80°39'58.1"	84
2-XII-93-2	27°41'49.6"	80°42'30.0"	84
2-XII-93-3	27°41'36.9"	80°44'08.9"	76
2-XII-93-4	27°40'48.2"	80°43'24.2"	72
2-XII-93-5	27°41'05.6"	80°43'39.1"	84
2-XII-93-6	27°36'48.0"	80°41'12.1"	92
21-I-94-7	27°38'38.3"	80°42'25.8"	92
21-I-94-8	27°52'12.8"	80°46'49.3"	64
21-I-94-9	27°57'02.0"	80°46'46.3"	60
8-II-94-10	Blue Cypress Lake (east-central basin)		96

Bagged samples were weighed to the nearest 0.01 g on a Fisher Scientific S-400 digital balance, and wet weight of the core sections was calculated by subtracting the average tare weight of Whirl-Pak™ bags. Mean and standard deviation for the weight of empty bags (tare) in Phase I was 4.09 ± 0.02 g (n = 5). The mean and standard deviation of the tare in Phase II was 4.35 ± 0.06 g (n = 10). During Phase I, Cores 1B and 3B were selected for pollen and mercury analysis because they were the longest sections from the two sites most distant from each other. Subsamples of homogenized wet material were removed from cores 1B and 3B at all contiguous levels down to 30 cm depth and at every other level thereafter. Samples for pollen analysis were mailed to B. Leyden (Dept. of Geology, University of South Florida).

Bagged samples from cores 1B and 3B were re-weighed on the digital balance to obtain the wet weight after removal of subsamples for mercury and pollen. Peat sediments are spongy and absorbent, making it difficult to obtain a representative, volumetric wet subsample for density (i.e. g dry cm^{-3} wet) measures. Sediment density for the cores was calculated using the equation presented by Binford (1990):

$$p_x = \frac{D(2.5I_x + 1.6C_x)}{D + (1-D)\,(2.5I_x + 1.6C_x)}$$

where p_x is dry density (g dry cm^{-3} wet), x is depth in the sediment profile (cm), D is proportion of dry mass in wet sediment (i.e. dry mass/wet mass), I is the inorganic proportion of dry mass, with density = 2.5 g cm^{-3} dry, and C is the organic proportion of dry material with density = 1.6 g cm^{-3} dry.

Samples from cores 1A, 1B, 2A, 2B, 3A, and 3B were dried by opening the Whirl-Pak™ bags and setting them upright in Rubbermaid™ clear plastic boxes. These boxes were put into large paper bags and placed in a Grieve Corporation Model SC-350 industrial drying oven at 60° C. After several weeks, incompletely dried samples were removed from the Whirl-Pak bags and placed in labelled Nalgene cups and dried for an additional 48 hours at 85°C in a small Blue M Electric Company drying oven until completely dry. Samples were transferred back to the Whirl-

Pak bags after drying. The ten cores collected in Phase II were partially dehydrated in a freeze drier and were then transferred to the Grieve industrial drying oven at about 80°C for final drying.

Following drying, all Whirl-pak bags and dried sediment contents were re-weighed on the Fisher digital balance. Dry sample mass was computed by subtracting the tare (bag) weight from the total weight of the dried sample and bag. Percent dry weight was calculated by dividing dry mass by wet mass (i.e. g dry ÷ g wet). Dried sediments were ground in a mortar and pestle and dry material was stored in labelled 20-mL plastic scintillation vials. Excess dry sediment that could not fit into the scintillation vials was returned to labelled Whirl-Pak™ bags and archived.

Organic matter content in sediments was assessed by measuring weight loss on ignition at 550 °C in a Sybron Thermolyne muffle furnace (Håkanson and Jansson 1983). In Phase I (cores 1A, 1B, 2A, 2B, 3A, 3B), all 2-cm samples between the sediment/water interface, i.e. the top of the core, and 30 cm depth were analyzed for organic matter content. Thereafter, every other 2-cm stratigraphic section was measured. The ten cores analyzed in Phase II were sectioned at 4-cm intervals and all samples were analyzed for organic matter content. Organic matter content is expressed as a fraction of dry mass (mg organic matter per g dry sediment).

Total carbon and nitrogen content in sediments was measured on a Carlo-Erba C-H-N analyzer. In Phase I cores (cores 1A, 1B, 2A, 2B, 3A, 3B) carbon and nitrogen determinations were run at every other 2-cm stratigraphic level starting at the top of the core. Total carbon measurements in sediments from cores 1B and 3B were also measured by coulometry on a UIC/Coulometrics Model 5011 coulometer (Huffman 1977). Temperature in the System 120 combustion furnace was set at 950 °C to liberate CO_2 bound in both organic matter and carbonates. For the ten cores studied in Phase II, total carbon and nitrogen determinations were run on every 4-cm interval from the cores. Total carbon and nitrogen content are expressed as a proportion of dry mass (i.e. mg C or N per g dry sediment).

Total phosphorus content in sediments was determined by digesting dry samples in a mixture of H_2SO_4 and $K_2S_2O_8$ (Schelske et al. 1986) and analyzing total P content using a Bran + Luebbe Autoanalyzer II with a single-channel colorimeter. In Phase I cores (cores 1A, 1B, 2A, 2B, 3A, 3B), all samples between the top of the core and 30 cm depth were analyzed for total P. Below 30 cm depth in the cores, every other 2-cm section was analyzed for total P content. For the ten cores studied in Phase II, every 4-cm section was analyzed for total P. Total P concentration in sediments is expressed as a fraction of dry mass (i.e. mg P per g dry sediment).

Wet subsamples from cores 1B and 3B were placed in 20-mL scintillation vials, frozen and delivered to B. Rood, UF Dept. of Environmental Engineering, on 13 October 1992. Analyses for total mercury in sediments from Cores 1B and 3B were completed in December 1992 and January 1993. Mercury content in sediments was determined by cold vapor atomic absorption spectrophotometry, following acid digestion at 95 °C (U.S. EPA). Twenty-nine samples were measured in core 1B and 26 samples were measured in core 3B. Total mercury concentrations are expressed as nanograms Hg g^{-1} dry mass (1 ng = 10^{-9} g).

Pollen was counted by Dr. B.W. Leyden (USF) in eight samples from core 1B and six samples from core 3B (Table 2). Counting of the samples from core 1B was completed first. Stratigraphic samples from core 3B were selected for counting based on pollen changes in core 1B. This approach was taken in an effort to pin down the timing of vegetation changes. Wet samples were prepared for palynological counts by sieving and chemical treatment with HCl, KOH, HF and acetolysis (Whitehead 1981). Pollen grains were counted at 400x magnification on a Wild compound microscope.

Table 2. Pollen grains counted in Blue Cypress Marsh Conservation Area cores 1B and 3B.

Core 1B depth (cm)	Grains counted	Core 3B depth (cm)	Grains counted
0-2	240	8-10	266
10-12	298	20-22	218
20-22	161	40-42	220
32-34	299	60-62	285
52-54	292	72-74	265
68-70	310	84-86	218
80-82	288		
88-90	304		

Sediment Dating

^{210}Pb is a naturally occurring radionuclide that is a member of the ^{238}U decay series. Radium-226 in local soils and rock decays to radon gas (^{222}Rn), some of which escapes to the atmosphere. Radon undergoes further rapid decays and ultimately produces ^{210}Pb (half-life = 22.3 years) that falls out, in particulate form, on land and lake surfaces. This fallout ^{210}Pb is often called "excess" or "unsupported" ^{210}Pb. Some of the ^{210}Pb that falls into lakes is incorporated into the lake sediments, and its distribution in the bottom deposits can be used to date the accumulated sediments (Appleby and Oldfield 1978, 1983).

Another source of ^{210}Pb in lake deposits is *in situ* radium (^{226}Ra). The ^{210}Pb generated by decay of radium on the lake bottom is called "supported" ^{210}Pb and can be estimated from ^{214}Bi activity or another ^{210}Pb precursor (e.g. ^{214}Pb or ^{226}Ra). We measure bismuth-214 activity, but by convention, we express the supported ^{210}Pb activity as ^{226}Ra activity. When activity is measured by gamma counting (Appleby et al. 1986), unsupported ^{210}Pb activity throughout a core can be calculated by either of two methods: 1) supported ^{210}Pb activity, estimated from ^{214}Bi activity, can be subtracted from total ^{210}Pb activity on a level-by-level basis over the length of the section, or 2) if ^{214}Bi (i.e. ^{226}Ra) activity is relatively low and constant over the length of the profile, total ^{210}Pb values from deep in the section (i.e. where ^{210}Pb activity $\approx$ ^{214}Bi) can be averaged and used as an estimator of supported ^{210}Pb which is then subtracted from up-core total ^{210}Pb activities. Either approach yields unsupported ^{210}Pb activity values at levels throughout the profile that can be entered into the c.r.s. (constant rate of supply) model to calculate dates (Appleby and Oldfield 1983).

Supported ^{210}Pb, as determined by ^{214}Bi counting, was low in Blue Cypress Marsh deposits. The implication is that there is very little radium-bearing material in the sediment matrix. Consequently, virtually all measured ^{210}Pb is unsupported. For dating purposes in Phase I, we used the mean ^{210}Pb activity from below the unsupported/supported boundary as an estimate of supported ^{210}Pb activity. This value was subtracted from the total ^{210}Pb activity to obtain unsupported ^{210}Pb activities and calculate dates. For the ten cores taken in Phase II, we opted to subtract the supported ^{210}Pb (^{226}Ra) from total ^{210}Pb on a level-by-level basis.

In Phase I, cores 1B, 2B and 3B were selected as primary cores for ^{210}Pb dating. Dates were calculated for cores 1B, 2B and 3B. Radioisotope activities in cores 1A, 2A and 3A (i.e. duplicate cores at sites 1, 2, and 3) were not used in dating models, but rather to test the replicability of isotopic data at coring sites 1, 2, and 3. One hundred and twenty-five samples were measured for isotopic activity in Phase I. In Phase II, two hundred samples were prepared for dating and eight of the ten cores were fully dated. Cores 21-I-94-7 and 21-I-94-9 appeared to be undatable based on the distribution of isotopic activity. One hundred and thirty-five samples were analyzed for isotopic activity in Phase II.

^{137}Cs is an artificial radionuclide that was injected into the atmosphere as a consequence of nuclear weapons testing. Introduction of artificial radionuclides began in the 1950s, but reached a peak in 1962-63 (Krishnaswami and Lal 1978). There has been a general decline in atmospheric nuclide levels since the early 1960s, with the exception of slight increases due to French and Chinese weapons testing in the late 1960s and early 1970s. The distribution of ^{137}Cs activity in the sediments can sometimes be used to identify the time period of maximum fallout.

Samples for radionuclide measurement were prepared using dried, ground sediment. Selected samples from all six Phase I cores were sealed in counting tubes in January 1993 for ^{210}Pb dating. In each core, contiguous samples between the sediment/water interface and 30 cm depth were prepared for radionuclide counting, and alternate samples between 30 cm and 50 cm were prepared. After initial counting of the uppermost samples, it was apparent that the unsupported/supported ^{210}Pb boundary was below 30 cm, and additional samples were sealed for counting on March 2, 1993. All contiguous samples down to 60 cm depth in each of the six cores were sealed, as were samples from 62-64 cm and 66-68 cm.

Very low density (i.e. g dry cm^{-3} wet) in near-surface deposits from several cores required the combining of material from two or more contiguous samples to provide sufficient dry mass for analysis. In such cases, sample masses were combined proportional to their bulk densities.

Because there is very little dry mass in the uppermost deposits, there is very little loss of dating resolution as a consequence of combing samples (i.e. the time period represented by the small amount of accumulated sediment is very short).

In core 1B, the topmost two samples (0-2 cm and 2-4 cm) were combined. In duplicate core 1A, the topmost samples were also combined (i.e. 0-2 cm and 2-4 cm). In core 2B, the top two samples were combined and likewise, samples from 0-2 cm and 2-4 cm in core 2A had to be mixed to provide sufficient material for counting. Sediment density was so low in core 3B that it was necessary to combine the four topmost samples (all material form 0 to 8 cm). The 8-10 cm and 10-12 cm samples were also combined for radioisotope measurement. In duplicate core 3A, the top two samples were combined for isotopic counting.

Dry material from every 4-cm section in the ten Phase II cores was prepared for dating. Subsamples of dry, ground material were removed for isotopic analyses. In all, 200 samples from the Phase II cores were prepared for gamma spectroscopy, and 135 samples from ten cores were ultimately measured.

Prior to analysis, sediment from each stratigraphic level in the cores was packed to a measured height of about 30 mm in tared plastic Sarstedt tubes that were re-weighed to obtain sample mass. Samples were sealed in the tubes with Epoxy glue and were permitted to equilibrate for at least three weeks before counting. The holding period allows the establishment of equilibrium between ^{226}Ra and ^{214}Bi, thereby permitting us to use the bismuth-214 activity as a proxy for "supported" ^{210}Pb activitiy. Activities were measured on two EG&G Ortec GWL High Purity Germanium coaxial well detectors. Detector 1 possesses a J-type cryostat configuration and Detector 2 is similar, but has a vertical cryostat configuration and low-background specifications. The active well in each detector is 40 mm deep and has a 15 mm inside diameter. The germanium crystal in Detector 1 has a diameter of 55.0 mm, a length of 61.3 mm, and an active volume of 120 cm^3, an aluminum end cap (0.5 mm) and resolution of 2.18 kev (FWHM @ 1.33 Mev for ^{60}Co). The germanium crystal in Detector 2 has a diameter of 55.6 mm, a length of 62.5 mm, and an active volume of >120 cm^3, an aluminum end cap (0.5 mm) and resolution of 2.11 kev (FWHM @ 1.33 Mev for ^{60}Co).

The detectors are attached to a 4096-channel pulse height analyzer. Total ^{210}Pb activity is measured by the 46.5 kev photon peak. ^{226}Ra-supported ^{210}Pb activity is obtained from the 609 kev peak of ^{214}Bi. ^{137}Cs activity is measured using the 662 kev peak. Compton-corrected background for each radionuclide is obtained by counting empty Sarstedt tubes. Background count rates for ^{210}Pb averaged over a period of 20 months were 0.189 ± 0.020 counts per minute (cpm) for Detector 1 and 0.0409 ± 0.015 cpm for Detector 2. Background counts for ^{214}Bi averaged 0.0226 ± 0.0096 cpm for Detector 1 and 0.0131 ± 0.0084 for Detector 2. Background counts for ^{137}Cs (<0.002 cpm) were negligible on both detectors. Net counts for radionuclides in each sample are obtained by subtracting the Compton-corrected background value from the Compton-corrected sample counts (see Schelske et al. 1994).

Counting efficiences for each radionuclide were obtained using a combination of mixed gamma standard Amersham QCY-48 dispersed in a dry sediment sample, and with a series of standards diluted with distilled water. Counting efficiences obtained from standards were further calibrated by exchange of samples with other laboratories.

Counting efficiency is influenced by sediment density and geometry (i.e. sample height in the Sarstedt tube). All activities for Blue Cypress Marsh samples were corrected for variation in height based on experiments in which the quantitative effect of sample geometry has been assessed (Schelske et al. 1994). Activities are also corrected for time elapsed between the date of coring and date of counting. ^{210}Pb activities, by virtue of their weak gamma signal, were also adjusted based on the empirically-determined effect of sample density (Schelske et al. 1994). Radioisotopic activities for all samples are expressed as the numbers of decays per minute per gram of dry sediment (dpm g^{-1} dry sediment).

Results

Physical/Chemical Composition

Stratigraphic changes in percent dry weight are most clearly demonstrated in cores 1A, 1B, 2A, 2B, 3A, and 3B because they were sampled at high-resolution (2-cm) intervals. These profiles show that percent dry weight typically increases with depth in the sediment, particularly over the first 15-20 cm. Topmost sediments (0-2 cm) from these cores contain little dry material, and range from 0.5% to 2.3% dry weight (Table 4, Figures 1-6). Percent dry weight increases with depth in the uppermost deposits as a consequence of increased sediment compaction downcore. Thereafter, in deeper, more consolidated sediments, percent dry weight increases gradually with depth, but there is some variation about the general trend.

The ten cores collected in Phase II also demonstrate the trend of generally increasing dry weight with depth in the core, particularly in the top portion of the profiles (Table 4, Figures 7-16). The exception is core 21-I-94-8, that was taken in an area where the ground surface was dry. The water table was about 12 cm below the surface at this coring site, and this core displays lower percent dry weight associated with the deeper, saturated deposits (Table 4, Figure 14).

For the marsh cores, maximum percent dry weight was measured at or near the base of each section. Core 21-I-94-8, taken at a dry site was the exception, with the topmost sample yielding the highest percent dry weight. Percent dry weight values near the base of cores typically ranged between 7 and 13% (Table 4, Figures 1-16).

Much as for percent dry weight, bulk density (g dry cm^{-3} wet) is low near the sediment surface and demonstrates a general increase with depth in the cores (Table 4, Figures 1-16). With the exception of core 21-I-94-8, taken in a desiccated area, and the Blue Cypress Lake core (21-I-94-10), topmost samples from sections contain only between 5 and 39 mg dry sediment cm^{-3} wet sediment (Table 4, Figures 1-16). Excluding the lake core, that occupies a very different sort of depositional environment, bottom deposits from the marsh core sections typically possess between 73 and 135 mg dry sediment cm^{-3} wet sediment (Table 4, Figures 1-16).

Weight loss on ignition measurements demonstrate that the marsh deposits are rich in organic matter (Table 4, Figures 17-32). All organic matter measurements in marsh sediments exceeded 800 mg g dry^{-1} and most samples contained >900 mg organic matter per g dry sediment. Most cores show a slight increase in organic matter with increasing depth in the profile, but the trend is not strong. Organic matter in the Blue Cypress Lake core (8-II-94-10) was considerably lower, ranging between about 390 and 700 mg g dry^{-1}. Nonetheless, even the Blue Cypress Lake deposits are rich in organic matter relative to most Florida lakes. For comparison, organic matter in lacustrine surface sediments from 97 Florida lakes displayed a mean and standard deviation of 397 $\pm$ 219 mg g^{-1} (Brenner and Binford 1988). Organic matter in surficial sediments from the 97-lake data set ranged from 8 to 842 mg g^{-1} organic content.

Sediments from Blue Cypress Marsh are rich in total carbon, virtually all of which is present in organic form (Table 4, Figures 17-32). In marsh sediments, the total carbon content ranges from about 390 to 560 mg C g dry^{-1}, and most values are in excess of 500 mg g^{-1}. Thus, more than half of the dry mass of these peaty deposits is carbon. Total carbon also constitutes more than half the organic matter mass in the marsh deposits. Again, there is a weak correlation between total carbon and depth in the profiles, particularly near the tops of cores. Total carbon concentrations in the Blue Cypress Lake core are somewhat lower than those measured in marsh sediments. Total C in the lake core varies between 216 and 418 mg g^{-1} and lowest values are associated with sand lenses in the core (Figure 32). Comparison of the marsh peats with surface sediments from 97 Florida lakes illustrates the high carbon content of the marsh deposits. Surface sediments from the Florida lakes contained a mean and standard deviation of 210 $\pm$ 119 mg total C g^{-1} dry, and ranged from 4 to 476 mg total carbon per g dry (Brenner and Binford 1988).

Total nitrogen content in the marsh cores ranged between about 22 and 46 mg N g^{-1} dry, but was typically between 30 and 40 mg N g^{-1} dry (Table 4, Figures 33-48). The Blue Cypress Lake core again proved to be an exception, with lower total N, varying between 15 and 30 mg g^{-1} over the length of the section. Lowest nitrogen concentrations in the lake core were associated with sandy deposits. Marsh sediments are relatively rich in nitrogen compared with Florida lake muds. For 97 Florida lakes, surface sediments yielded a mean and standard deviation for total N content of 16.7 ± 10.3 mg g^{-1} (Brenner and Binford 1988). Total N in the surficial lake sediments ranged between 0.6 and 42.4 mg g^{-1}.

Total phosphorus concentrations in Blue Cypress Marsh sediments display a strong gradient, with topmost samples much richer in total P than basal deposits (Table 4, Figures 33-48). Bottommost samples in marsh profiles possess between 0.01 and 0.11 mg P g^{-1} dry sediment. Surface deposits are considerably richer, ranging from 0.38 to 2.67 mg P g^{-1} dry sediment. Although the Blue Cypress Lake core contains somewhat higher total P in basal deposits (0.22 mg P g^{-1}) than do marsh cores, the lake core also displays a trend of increasing total P content toward the surface of the section. The topmost sample in the lake core contains 0.99 mg P g^{-1}. Although total P values in surface deposits of marsh cores are higher than concentrations measured in deeper deposits, they are for the most part lower than values measured in surficial deposits of Florida lake cores. For 97 Florida lakes, the mean and standard deviation for total P content is 1.60 ± 1.54 mg g^{-1} (Brenner and Binford 1988). Values ranged from 0.07 to 8.09 mg g^{-1}.

Isotopic Activity

Most of the cores display a general decline in total ^{210}Pb activity with increasing depth in the sediment (Table 5, Figures 49-64). Uppermost deposits typically show activities ranging from 10 to 25 dpm g^{-1} dry. In some cases, activities in topmost samples are somewhat lower than activities measured in immediately underlying levels. There may be several reasons for this. First, actively growing algal mats or other plant material at the sediment surface may "dilute" incoming, unsupported ^{210}Pb. Second, recent rapid sediment deposition combined with insufficient time for sediment diagenesis, may dilute the atmospherically-derived radioisotope. Finally, large particles such as undegraded plant remains in surficial deposits may be poor binding sites for ^{210}Pb. Nevertheless, unless there is transport of ^{210}Pb through the sediment column, the c.r.s. model can accommodate the irregular distribution of ^{210}Pb activity in the profile, and sediments can be dated. The only cores that proved problematic for ^{210}Pb dating were cores 21-I-94-7 and 21-I-94-9. Total ^{210}Pb did not vary appreciably over the length of core 21-I-94-7 (Figure 61), and there is little change in activity down to a depth of 28 cm in core 21-I-94-9 (Figure 63), suggesting postdepositional movement of atmospherically-derived ^{210}Pb or severe sediment mixing. Both cores display a strong total P gradient that argues against bulk sediment mixing, so radioisotope movement is more probable. In any event, isotopic counting of core 21-1-94-7 was terminated at a depth of 52 cm, and we stopped counting core 21-I-94-9 at 40 cm depth.

All marsh cores display low ^{226}Ra activity (i.e. ^{214}Bi activity) implying that virtually all ^{210}Pb comes from atmospheric sources, which is to say that there is almost no *in situ* source of ^{210}Pb production (Table 5, Figures 49-63). Of 246 samples from marsh deposits that were counted by gamma spectroscopy, only 27 yielded >1 dpm g^{-1} ^{226}Ra. The highest value was recorded at 0-4 cm in core 2-XII-93-1 (3.45 dpm g^{-1} dry). The Blue Cypress Lake section differed somewhat from the marsh cores in that radium-226 activity was higher in the lake sediments, ranging between 1.6 and 3.6 dpm g^{-1}. As in many Florida lakes, there appears to be an increase in radium activity toward the top of the core (Figure 63), that may reflect higher deposition rates of ^{226}Ra during very recent times (Brenner et al. 1994, Brenner and Whitmore 1992).

The total integrated (total residual) unsupported ^{210}Pb measured in the 10 marsh cores varied between 11.5 and 23.8 dpm cm^{-2}. This value represents the total integrated amount of unsupported ^{210}Pb that has accumulated below a square centimeter of sediment surface and can be used to calculate the site-specific ^{210}Pb fallout rate (Appleby and Oldfield 1983). The mean and standard deviation for the total residual unsupported ^{210}Pb was 17.9 ± 3.7 dpm cm^{-2}. The mean total residual value translates to a mean fallout rate of 0.56 dpm cm^{-2} yr^{-1}. The data suggest minimal site-to-site variability in fallout rate. They also suggest that the fallout rate in Blue Cypress Marsh is generally lower than the reported global average of about 1.1 dpm cm^{-2} yr^{-1} (Nozaki et al. 1978), and somewhat lower than mean fallout rates (0.77-1.21 dpm cm^{-2} yr^{-1}) recorded in several regions of Florida (Binford and Brenner 1986, 1988). It is notable that the core from Blue Cypress Lake yielded a total residual unsupported ^{210}Pb value of 48.3 dpm cm^{-2}, which translates to a fallout rate at the site of 1.50 dpm cm^{-2} y^{-1}. It is very probable that the high accumulation of unsupported ^{210}Pb at the coring sitre reflects the fact that the core was collected in a depositional zone to which sediments are preferentially focused. All nutrient accumulation rates calculated based on the lake core are probably biased toward the high side and do not represent the lakewide mean values (Binford and Brenner 1988).

Most of the cores fail to display a sharp peak in ^{137}Cs activity (Table 5, Figures 49-64). ^{137}Cs activity is spread throughout the profiles and was measured even at depths where there is very little unsupported ^{210}Pb (i.e. sediments that predate the turn of the century). In Florida lakes, ^{137}Cs has not proven to be a reliable, independent dating marker (Brenner et al. 1994). Several factors may account for the odd distribution of ^{137}Cs activity throughout the sediment profiles and its presence in deep, older deposits. First, highly soluble cesium may be carried through the sediment column in downward percolating water. This is probable in the Blue Cypress Marsh, where sediments are highly organic and lack the 2:1 lattice clays that might otherwise serve as adsorption sites for cesium. Second, uptake of cesium by plants may redistribute the radionuclide throughout the sediment column. Plants may incorporate the element much as they would take up potassium. Although ^{137}Cs in Blue Cypress Marsh deposits does not accurately identify the period of maximum atmospheric bomb testing, it serves as a rough check on ^{210}Pb dates.

Sediment Dating and Material Accumulation Rates

Sediment ages were determined using the constant rate of supply (c.r.s.) model (Appleby and Oldfield 1978, 1983, Oldfield and Appleby 1985). Sediment ages were assigned based on the date when cores were collected (i.e. years before coring date). Age/depth plots visually display changes in linear sediment accumulation rates (cm yr^{-1})[Figures 65-75]. Increases in linear accumulation rates near the tops of many sections in part reflect lack of sediment compaction in these unconsolidated upper deposits. Likewise, slower linear sediment accumulation rates at depth in the profiles reflects compaction and dewatering of these older deposits. Apparently slow bulk sediment accumulation rates near the base of the sections are probably an artifact of the c.r.s. model that produces "too-old" dates near the bottom of profiles (Binford 1990). We reject calculated ages >100-150 years old and consider computed accumulation rates for the period prior to about 1875 to be unreliable. Mean and standard deviation of the linear sedimentation rate recorded since the turn of the century among the ten dated marsh cores is 0.34 ± 0.6 cm yr^{-1}. The mean rate of linear sedimentation at the lake core site was 0.40 cm yr^{-1}.

Although there are no dramatic trends in mass-based bulk sediment accumulation rates, all dated cores display modern bulk sediment accumulation rates (mg cm^{-2} yr^{-1}) that are consistently higher than rates recorded deeper in the profiles (Table 6, Figures 65-75). There may be several reasons for the consistency of these general trends. Because the c.r.s. model computes "too-old" ages near the base of cores (Binford 1990), sedimentation rates computed for levels near the base of the sections are artificially low. In addition, counting errors are typically much greater in older sections of the core. For these reasons we consider accumulation rates calculated for the last century to be the only reliable values. Very recent accumulation rates may be biased toward the high side. Compared with underlying, older deposits, near-surface sediments have not been subjected to diagenetic processes for very long and may ultimately lose mass with the passage of time.

Organic matter and elemental (C,N,P) accumulation rates at the coring sites were computed by multiplying the bulk sediment accumulation rate times the concentration of organic matter or the element in dry sediment (Table 6). At depths below 30 cm in cores 1B, 2B, and 3B, where LOI and elemental analyses were not completed at all levels, concentrations of organic matter, C, N, and P were interpolated by computing the mean of the concentrations measured in the sample above and below the depth of interest. Organic matter and nutrient concentrations change little with increasing depth below 30 cm, so there is little error contributed by interpolation.

Organic matter accumulation rates at the coring sites demonstrate increases through time that primarily reflect increases in bulk sediment accumulation rates during recent years (Table 6, Figures 76-86). Minimal organic matter accumulation rates were recorded in the basal portions of the datable part of the sections. With the exception of core 2-XII-93-5, maximum organic matter accumulation rates were measured for the topmost sections of cores (Table 6, Figures 76-86). Again, low apparent rates at the base of cores may be a dating anomaly and high apparent accumulation rates of organic material in recent deposits may reflect the lack of diagenetic breakdown of these very young sediments.

Similar to organic matter, total carbon accumulation rates in the cores demonstrate an increasing trend over time (Table 6, Figures 76-86). Because carbon content of the sediment changes little over the length of the section, most of the change in accumulation rate is attributable to shifts in bulk accumulation rates. As for organic matter, lowest carbon accumulation rates were recorded near the bottom portion of the datable section of the cores, whereas maximum accumulation rates were registered in the uppermost part of cores. Again, although basal C accumulation rates and modern C accumulation rates may be biased by the dating model and lack of diagenesis, respectively, gradual trends over time are real. Nitrogen accumulation rates vary through time much in the same manner as do organic matter and total carbon accumulation rates (Table 6, Figures 87-97).

All eleven dated cores show rather dramatic increases in total P accumulation through time (Table 6 and Figures 87-97). These increases in total P accumulation reflect both increasing concentration of P in the sediment through time as well as slight increases in bulk sediment accumulation through time. In all cores, modern P accumulation rates are more than an order of magnitude greater than rates calculated for the base of the section.

Because accumulation rates computed for the basal sections of cores suffer from "too old" age error, and the topmost samples from cores may yield artificially high rates of accumulation due to the lack of diagenesis, we sought an alternative and conservative approach to assess changing nutrient accumulation rates in the Blue Cypress Marsh. We used the mean rate of accumulation since the 1970s and compared that value to the prevailing rate around 1920. The rationale for this approach was that by 1920, nutrient accumulation rates were stable, but unaffected by "too old" ages that impact the base of cores. By computing the average nutrient accumulation rate since the latest date in the 1970s, we avoid the effect of "weighting" the topmost sample that may be rich in nutrients due to algal growth or demonstrate high accumulation rate due to lack of diagenesis. With the exception of core 21-I-94-8, using the mean nutrient accumulation rate since the 1970s required calculation of the mean over three or four stratigraphic samples, thereby damping the effect of any anomalously high single sample.

For all eleven dated cores, total carbon accumulation rates around 1920 ranged between 4.4 and 13.0 mg cm^{-2} yr^{-1}. Since the 1970s, carbon accumulation rates at the eleven coring sites ranged between 11.7 and 24.4 mg cm^{-2} yr^{-1}. All eleven cores demonstrate an increase in the rate of carbon sequestering at the core sites, and that increase ranges from 1.6-fold to 3.0-fold (Figure 98). Likewise, the nitrogen accumulation rate recorded for 1920 ranged from 0.33 to 1.06 mg cm^{-2} yr^{-1} among the eleven core sites. Since the 1970s, total N accumulation has ranged between 0.80 and 1.76 mg cm^{-2} yr^{-1}. Increases are apparent at all sites and range from 1.6- to 3.7-fold (Figure 99). Because of the much higher total P content in deep sediments from Blue Cypress Lake core, we first consider the ten cores from the marsh. In 1920, total phosphorus accumulation rate at the marsh sites was between 0.002 and 0.006 mg cm^{-2} yr^{-1}. Since the 1970s that rate has been between 0.008 and 0.038 mg cm^{-2} yr^{-1}. These modern rates are some 2.3 to 17.0 times rates recorded seventy years ago (Figure 100). In Blue Cypress Lake, the rate around 1920 was 0.019 mg cm^{-2} yr^{-1}, but this has increased to 0.044 mg cm^{-2} yr^{-1} since the late 1970s. Although these values may be biased by sediment focusing in the lake, the increase in P accumulation rate through time is demonstrable.

Mercury

Mercury concentrations in core 1B range from 40 ng g^{-1} dry (68-70 cm) to 151 ng g^{-1} dry at 10-12 cm (Table 7 and Figure 101). Excluding the mercury-rich sample from 76-78 cm (150 ng g^{-1} dry), it appears that samples in the uppermost 28 cm of the core generally contain more mercury than sediments below that depth. Mercury concentrations in core 3B range from 59 ng g^{-1} dry (72-74 cm) to 393 ng g^{-1} dry at the top of the section. Similar to core 1B, mercury concentrations are generally higher in the upper section of the profile.

Mercury accumulation rate at the 1B site increased rather regularly from about 1 to about 4 ng cm^{-2} yr^{-1} within this century (Table 8 and Figure 102). The regular trend is not detected at site 3B, and the high recent mercury accumulation rate at site 3B (14.7 ng cm^{-2} yr^{-1}) reflects both high concentrations of mercury in the sediment and high, modern bulk sediment accumulation rate (Figures 100 & 66).

Pollen

Pollen profiles for cores 1B and 3B are presented in Figures 103 and 104. Pollen abundances are plotted in relative percentage diagrams (i.e. each taxon is plotted at each analyzed stratigraphic level as a percentage of the total pollen). Aquatic genera *Typha* (cattails), *Nuphar* (water lilies) and *Sagittaria* (arrowhead) were excluded from the pollen sum and are expressed as a percentage of the non-aquatic-pollen sum. This approach is taken so that stratigraphic changes in the relative abundance of pollen from terrestrial and wetland taxa do not affect the percentage representation of aquatic taxa. Conversely, a shift in the relative abundance of aquatic taxa will not affect the relative abundance of pollen from upland species. The pollen assemblage is dominated by *Pinus* (pines), *Myrica* (wax myrtles), Cupressaceae (white cedar), Gramineae (grasses), Chenopodiaceae-Amaranthaceae (Cheno-Ams), Compositae (composites), and Cyperaceae (sedges).

Generally, it appears that water level rose and freshened about mid-way in the profiles, following a period of low-water, or even brackish conditions. This is based on the shift from Cheno-Am dominance to greater presence of *Myrica*, and the increased representation of *Nuphar* in the more recent deposits. Additionally, *Taxodium* (cypress) grains were found in topmost sediments as were grains of the marsh plant *Cephalanthus* (buttonbush). *Typha* only appears above 20 cm in the two cores, after about 1948. *Cladium* was only detected in the 8-10 cm sample from core 3B (i.e., the late 1970s).

Discussion

Sediments in Blue Cypress Marsh and Blue Cypress Lake contain long-term paleoenvironmental records that were deciphered using paleolimnological techniques. Among the information that was gleaned from the sediment record was a history of nutrient (C, N, P) accumulation in sediments, a record of historical mercury deposition in the marsh, and a record of historical vegetation changes in the Blue Cypress Marsh wetland. Ten sediment profiles from the marsh and one core from Blue Cypress Lake were successfully dated by ^{210}Pb measurement and application of the constant-rate-of-supply model. Three duplicate cores collected from the marsh were partially analyzed by gamma spectroscopy to evaluate the replicability of radioisotope distribution in marsh deposits. These cores demonstrate site-specific replicability of isotopic stratigraphy and are potentially datable. Only two profiles (cores 21-I-94-7 and 21-I-94-9) proved problematic for dating, as total ^{210}Pb activity did not vary even at appreciable depths below the sediment surface.

^{226}Ra (i.e. supported ^{210}Pb) activities are consistently low in the marsh deposits, generally <1 dpm g^{-1}. The implication of this finding is that the downcore, asymptotic total ^{210}Pb value can be used as an estimator of supported ^{210}Pb activity. It is not imperative to measure supported ^{210}Pb activity by gamma spectroscopy at all levels in marsh cores, and future dating of marsh deposits can be done equally well by alpha counting. Sediments from Blue Cypress Lake display higher ^{226}Ra activities (1.26-3.60 dpm g^{-1}) and any future dating of lake cores should be done by gamma counting in order to assess supported ^{210}Pb activities on a level-by-level basis.

Cores from Blue Cypress Marsh do not routinely display a clear ^{137}Cs peak. Furthermore, cesium-137 activity is frequently measured at depths in the core that were determined by ^{210}Pb dating to predate bomb testing by many decades. It is probable that cesium is mobile in marsh deposits and is carried to deep sites in the sediment profiles by downward percolating water. Organic wetland sediments lack 2:1 lattice clays that would otherwise serve as effective binding sites for the highly soluble, anthropogenic radionuclide. Despite the failure of ^{137}Cs to serve as an accurate and independent dating marker, peak ^{137}Cs actvities correspond roughly to the time period of maximum cesium fallout (1963), and generally support the sediment ages computed using the ^{210}Pb dating model.

Duplicate cores collected in Phase I of the Blue Cypress Marsh study yielded similar stratigraphic results for physical and chemical variables as well as for radionuclide activities. Duplicate sections were taken tens of meters apart from each other, but stratigraphic similarities suggest that single cores are sufficent to describe regional sediment stratigraphies. In all replicate cores, recent sediments are richer in phosphorus than are older, downcore deposits.

With the exception of core 21-I-94-8, that was taken in a dry area, all cores demonstrate a general increase in percent dry weight and bulk density with increasing depth in the profiles. This trend is most pronounced in the upper part of the sections and reflects increased compaction and dewatering of deeper sediments. Sediments in the Blue Cypress Marsh display very high organic content, and most samples are more than 90% organic matter by weight. Likewise, marsh sediments are rich in total carbon, virtually all of which is present in organic form. Marsh deposits typically contain about 50% total carbon by weight. As a consequence of the high organic content of Blue Cypress Marsh deposits, they are also rich in nitrogen, typically containing 2-4% total N. The Blue Cypress Lake sediments typically contain less organic matter, C, and N than marsh deposits, and lowest organic matter, C, and N concentrations in the lake core were associated with sand-rich levels.

All sixteen study cores demonstrated a pronounced increase in total phosphorus concentration toward the top of the profiles. We propose several possible explanations to account for the stratigraphic trend in total P concentration. First, higher total P content in very recent sediments may reflect increasing P delivery rates to the system through time. Alternatively, high total P in surface and near-surface deposits may simply reflect the presence of P-rich, benthic algae. These algae possess little support tissue and thus display a much lower C:P ratio than macrophyte remains. Finally, high total P concentrations near the sediment surface may be indicative of post-depositional vertical mobility of the nutrient in the marsh deposits (Carignan and Flett 1981). Phosphorus in these peaty deposits is probably bound primarily in refractory organic particulates. This would suggest that P dissolution and vertical transport of P in interstitial water is probably not important in determining total phosphorus distribution in the profiles. To test this assertion, we suggest fractionation studies designed to evaluate the compartments in which P is bound.

Linear sediment accumulation rates in the marsh and lake were calculated using the ten dated marsh cores and the single core from Blue Cypress Lake. Since the turn of the century, sediment has accumulated in the marsh at a mean rate of 0.34 ± 0.6 cm yr^{-1}. At the lake coring site, the mean rate of linear sedimentation has been 0.40 cm yr^{-1}. In the latter case, the rate is probably biased toward the high side because the total residual integrated ^{210}Pb value for this core was quite high (48.3 dpm cm^{-2}) relative to the mean for the marsh cores (17.9 ± 3.7 dpm g^{-1}), suggesting that the core was collected in an area where sediments are focused.

Modern rates of bulk sediment accumulation, organic matter accumulation and nutrient sequestering on the bottom of Florida lakes were measured in 34 Florida basins using the "^{210}Pb dilution" method (Binford and Brenner 1986). The lacustrine accumulation rates were compared to rates recorded in the uppermost deposits of Blue Cypress Marsh cores and the Blue Cypress Lake core (Table 3.)

Recent organic matter, total carbon and total nitrogen accumulation rates in Blue Cypress Marsh are similar to the corresponding mean values recorded for the 34-lake data set. Bulk sediment accumulation rates in lakes are probably higher than those recorded for the marsh because lakes receive much higher inputs of inorganic material. Likewise, mean total P accumulation in the Blue Cypress Marsh is lower than the mean recorded for the lake basins. Recent P accumulation rates at several sites in the Blue Cypress Marsh are lower than the minimum value recorded in the 34-lake data set. It is notable that the modern rate of P accumulation in Blue Cypress Lake is <40% of the mean value for the larger lake data set. Although recent total P accumulation in the Blue Cypress Marsh ecosystem is low relative to aquatic ecosystems elsewhere in the state, many of the lakes in the 34-lake data set overlie phosphate-rich deposits of the Bone Valley Formation and might be expected to display unusually high P accumulation rates.

Despite the fact that total P accumulation rates in the marsh are low relative to those measured in Florida lakes, all sites in the marsh and the core from Blue Cypress Lake registered dramatic increases in total P accumulation over time. The most recent P accumulation rates exceed rates calculated for the base of the sections by more than 10 times. Both an increase in total P content of the sediment and slight increases in bulk sediment accumulation through time account for the rise in P accumulation rate during recent times.

Table 3. Recent sediment accumulation rates (mg cm^{-2} yr^{-1}) in 34 Florida lakes, in Blue Cypress Marsh and Blue Cypress Lake. Florida lake data are for mid-basin samples and represent mean lakewide sedimentation rates for the 2-10 year period prior to sample collection. Data for Blue Cypress Marsh and Blue Cypress Lake represent site-specific accumulation rates for the 1-12 year period prior to core collection.

	Bulk	Organic Matter	Carbon	Nitrogen	Phosphorus
*Florida Lakes					
Mean	234	39.8	20.0	1.83	0.171
sd	407	19.3	10.3	1.07	0.134
range	32-2080	15.3-88.9	6.9-46.7	0.56-4.42	0.024-0.586
Blue Cypress Marsh Cores					
1B	37	33.4	16.3	1.11	0.010
2B	46	41.9	20.8	1.61	0.022
3B	62	53.7	25.9	2.58	0.030
2-XII-93-1	57	49.1	23.5	2.21	0.085
2-XII-93-2	43	39.7	20.9	1.58	0.042
2-XII-93-3	34	31.8	16.9	1.06	0.014
2-XII-93-4	31	28.9	14.5	1.06	0.012
2-XII-93-5	27	24.5	12.7	0.88	0.014
2-XII-93-6	45	42.7	21.3	1.25	0.024
2-XII-93-8	52	46.2	24.4	1.76	0.038
8-II-94-10 (Lake)	67	45.7	25.5	1.77	0.066
Mean	46	39.8	20.2	1.53	0.032
sd	13	9.1	4.5	0.53	0.024
range	27-67	24.5-53.7	12.7-25.9	0.88-2.58	0.010-0.085

*From Binford et al. 1992

In an effort to quantify the change in total P accumulation in the Blue Cypress Marsh ecosystem, we took a conservative approach to comparing historic and modern P accumulation rates. We compared the mean rate of P accumulation since the 1970s to the rate of P sequestering that prevailed around 1920. Phosphorus accumulation rates in the marsh since the 1970s have been 2.3 to 17.0 times higher than rates recorded for the period around 1920. In Blue Cypress Lake, the rate of P accumulation since the 1970s was 2.3 times higher than the rate recorded for 1920. It is assumed that the calculated historic trends in total P accumulation accurately reflect past deposition (i.e. loading) rates of phosphorus. Computed rates of P sequestering may, however, be affected by post-depositional migration of the element. Nevertheless, most sediment P in the marsh is probably bound in refractory organic particulates, and until it can be demonstrated that P does migrate in the sediment column, we believe that our P accumulation rate measures closely approximate the original P deposition rates.

Based on data from all eleven ^{210}Pb-dated cores, we conclude that Blue Cypress Marsh and Blue Cypress Lake have experienced increases in total P loading over the past 70 years. This increased phosphorus supply has probably been responsible for higher primary productivity in the marsh ecosystem. Rates of carbon and nitrogen burial in sediments were higher since the 1970s than in 1920. In most cases, C and N accumulation rates in the 1970s were one- to three-fold higher than rates registered in 1920 and these higher rates may reflect increasing plant production. In any case, increases in C and N burial between 1920 and the present are not as pronounced as changes in P accumulation rate over the same time period. Several factors may account for the disparity. First, some of the total P reaching the ecosystem may be delivered in a form that is unavailable for plant growth. Second, something other than P may now be limiting primary productivity. Finally, diagenetic processes may reduce C and N content of sediments via respiration, methanogenesis and denitrification. Phosphorus, on the other hand, is permanently sequestered in marsh deposits due to its sedimentary biogeochemical cycle.

Mercury concentrations in the two Blue Cypress Marsh sediment cores are comparable to concentrations measured at wetland sites in the Florida Everglades, Savannas State Reserve and Okefenokee Swamp (Rood 1993). Surface sediments (0-4 cm) in the latter study had a mean Hg content of 121 ng g^{-1} and range of 17-411 ng g^{-1}. The average Hg content in the topmost 4 cm of the Blue Cypress Marsh 1B and 3B cores (measured at 2-cm intervals and weighted for changes in bulk density), was 108 and 245 ng g^{-1}, respectively. In core 1B, Hg concentrations in sediments above 28 cm are generally higher than concentrations measured in deeper deposits. In core 3B, Hg concentrations in sediments above 40 cm are generally greater than values deeper in the section (Table 7, Figure 100).

Mercury accumulation rates in Blue Cypress Marsh are similar to values computed by Rood (1993) based on 18 wetland cores. The mean, post-1985 rate for 18 wetland sites was 5.3 ng cm^{-2} yr^{-1} (range 2.3-14.1 ng cm^{-2} yr^{-1}), and the post-1985 Hg accumulation rates at Blue Cypress Marsh sites 1B and 3B were 3.5 and 9.1 ng cm^{-2} yr^{-1}, respectively. Rood (1993) found that post-1985 Hg accumulation rates were on average 6.4 times higher than Hg deposition rates at the turn of the century. In Blue Cypress Marsh, post-1985 rates are 4-fold (1B) and 5-fold (3B) higher than values recorded for the period around 1900.

Differences between pollen profiles from sites 1B and 3B suggest that pollen may record local rather than regional changes in vegetation. Nevertheless, dominant taxa are the same at both coring locations, and some trends, such as the relative decline in Cheno-Ams and grasses are consistent, as are increases in the relative abundance of *Myrica* and composites. Changes in the pollen assemblage suggest a deepening and perhaps freshening of the system through time. In both profiles, pollen of*Typha* only appears in relatively recent deposits dating from the last four decades. Likewise, *Cladium* pollen was counted only in the uppermost sediments from core 3B that were deposited a little more than a decade ago. Although the pollen record offers no evidence that *Typha* it is displacing *Cladium*, the data must be interpreted with caution. Pollen from these emergent species may not be widely dispersed, and the pollen record may only reflect localized presence of the species. Furthermore, most marsh plants generally propagate vegetatively (Kushlan 1990), so that these taxa may not be prolific pollen producers.

Conclusions

Paleolimnological techniques were used successfully to interpret the historical ecology of the Blue Cypress Marsh. This investigation demonstrates that ^{210}Pb measurements can be utilized to date marsh deposits and calculate accumulation rates of nutrients and metals in wetland sediments. Simultaneous measurement of ^{210}Pb, ^{226}Ra (i.e. ^{214}Bi), and ^{137}Cs activities by gamma spectroscopy yielded several findings of interest for future studies in the marsh. First, supported ^{210}Pb (^{226}Ra) activities in the wetland sediments are low, suggesting that either alpha or gamma counting can be used to date sediments reliably. Second, Blue Cypress Lake sediments contain higher and variable ^{226}Ra activity and must be dated by gamma counting techniques. Finally, ^{137}Cs fails to demonstrate a clearly defined peak that would indicate the period of maximum atmospheric fallout ca. 1963. Instead, ^{137}Cs activity is distributed throughout the sediment column and even found at depths that predate the 1963 fallout maximum by decades. The distribution of ^{137}Cs throughout the marsh profiles is probably attributable to post-depositional movement of the soluble radionuclide in interstitial water and uptake and transport by plants. In any case, high ^{137}Cs activities in cores can only be used in a general way to support the outcome of ^{210}Pb dating.

Blue Cypress Marsh sediments demonstrate fairly consistent stratigraphies with respect to physical characteristics and nutrient concentrations. Sediment profiles from inundated areas display increases in percent dry weight and bulk density (g dry cm^{-3} wet) with increasing depth in cores, particularly near the top of sections. This is attributable to greater compaction and dewatering of deeper deposits. This trend was reversed in only one core, where the water table was about 12 cm below the land surface, and uppermost deposits consequently displayed higher percent dry weight and bulk density.

Blue Cypress Marsh sediments are very organic-rich, typically containing >90% organic matter by weight. Likewise, the total carbon and nitrogen content of these wetland sediments is high, generally exceeding 50% and 3%, respectively. For the most part, there are no strong trends with respect to depth in the profiles and concentrations of organic matter, carbon, and nitrogen. Unlike C and N distribution in profiles, total phosphorus consistently displays higher concentrations near the tops of cores. This is probably attributable to recent increases in P loading to the Blue Cypress Marsh, but may in part be an artifact caused by growth of P-rich algae on the sediment surface or post-depositional movement of P in sediments. The latter process may be ruled out by fractionation studies designed to identify how phosphorus is bound in marsh deposits.

The ten ^{210}Pb-dated marsh cores show that linear sedimentation rates since the turn of the century have averaged 0.34 ± 0.6 cm yr^{-1}. At all sites there is a general increase in mass sediment accumulation through time and very recent accumulation rates are typically the highest recorded values. These results suggest greater production of organic matter (i.e. higher productivity) during recent years, but may also reflect insufficient time for diagenetic breakdown of recently deposited sediments. Data from eleven sites (ten marsh sites and one lake site) indicate that bulk sediment accumulation for about the last decade has averaged 46 ± 13 mg cm^{-2} yr^{-1} (range 27-67 mg cm^{-2} yr^{-1}).

All eleven dated cores reveal increased total phosphorus accumulation over time. Higher P accumulation in recent years is a consequence of higher recent bulk sediment accumulation rates combined with the fact that topmost deposits contain greater concentrations of total P. It is probable that recent higher accumulation rates of P reflect higher recent P loading rates to the marsh. Nevertheless, calculated P accumulation rates may be influenced by post-depositional movement and concentration of phosphorus in topmost deposits. Phosphorus fractionation studies may be able to rule out the effects of post-depositional P transport.

Mercury profiles from two sites in Blue Cypress Marsh (1B and 3B) show concentration gradients that are typical of other wetland sites in the southeastern United States. At both core localities in the marsh, Hg concentrations are generally higher in recent sediments as compared with older, deeper deposits. Since 1985, mercury has accumulated at site 1B four times faster than rates estimated for the turn of the century. At site 3B, there has been a 5-fold increase in mercury deposition compared with the estimate for 1900.

The principal terrestrial pollen types recorded in sediment cores 1B and 3B from Blue Cypress Marsh include pine, wax myrtle, white cedar, grasses, Cheno-Ams, composites, and sedges. The major aquatic taxa represented include cattails, water lilies and arrowhead. A shift midway in the cores from Cheno-Am dominance to greater presence of wax myrtle and an increase in water lily pollen suggests deepening and freshening of water in this wetland. The presence of pollen of cypress and buttonbush in topmost deposits supports this interpretation. Cattail pollen is only represented in sediments deposited during the last four decades and sawgrass pollen at site 3B only appears in the late 1970s. The pollen record provides no evidence that *Typha* is replacing *Cladium* near these core sites.

^{210}Pb-dated sediment cores from the Blue Cypress Marsh shed light on nutrient loading of the wetland, the vegetation history of the marsh, and trends in atmospheric mercury deposition. This historical perspective on ecosystem changes may be helpful for formulating future wetland management plans.

References Cited

Appleby, P.G., & F. Oldfield. 1978. The calculation of lead-210 dates assuming a constant rate of supply of unsupported lead-210 to the sediment. Catena 5:1-8.

Appleby, P.G. and F. Oldfield. 1983. The assessment of ^{210}Pb data from sites with varying sediment accumulation rates. Hydrobiologia 103: 29-35.

Appleby, P.G., P.J. Nolan, D.W. Gifford, M.J. Godfrey, F. Oldfield, N.J. Anderson, & R.W. Battarbee. 1986. ^{210}Pb dating by low background gamma counting. Hydrobiologia 143:21-27.

Binford, M.W. 1990. Calculation and uncertainty analysis of ^{210}Pb dates for PIRLA project lake sediment cores. Journal of Paleolimnology 3:253-267.

Binford, M.W., and M. Brenner. 1986. Dilution of ^{210}Pb by organic sedimentation in lakes of different trophic states, and application to studies of sediment-water interactions. Limnology and Oceanography 31:584-595.

Binford, M.W., and M. Brenner. 1988. Reply to comment by Benoit and Hemond. Limnology and Oceanography 33:304-310.

Binford, M.W., M. Brenner, and D.R. Engstrom. 1992. Temporal sedimentation patterns in the nearshore littoral of Lago Huiñaimarca. Pp. 29-39, In C. Dejoux and A. Iltis, *Lake Titicaca, a Synthesis of Limnological Knowledge*. Kluwer Academic Publishers, Norwell, MA. 573 p..

Brenner, M. and M.W. Binford. 1988. Relationships between concentrations of sedimentary variables and trophic state in Florida lakes. Canadian Journal of Fisheries and Aquatic Sciences 45:294-300.

Brenner, M. and T.J. Whitmore. 1992. Lake Hollingsworth Sediments and Historical Ecology. Final report prepared for the Southwest Florida Water Management District. 53 p.

Brenner, M., A.J. Peplow, and C.L. Schelske. 1994. Disequilibrium between ^{226}Ra and supported ^{210}Pb in a sediment core from a shallow Florida lake. Limnology and Oceanography 39:1222-1227.

Carignan, R. and R.J. Flett. 1981. Postdepositional mobility of phosphorus in lake sediments. Limnology and Oceanography 26:361-366.

Fisher, M.M., M. Brenner, and K.R. Reddy. 1992. A simple, inexpensive piston corer for collecting undisturbed sediment/water interface profiles. Journal of Paleolimnology 7:157-161.

Håkanson, L. and M. Jansson. 1983. Principles of lake sedimentology. Springer-Verlag, NY. 316 p.

Huffman, E.W.D., Jr. 1977. Performance of a new automatic carbon dioxide analyzer. Microchemical Journal 22:567-573.

Krishnaswami, S., & D. Lal. 1978. Radionuclide limnochronology. P. 153-177, In A. Lerman (ed.), *Lakes: chemistry, geology, physics*. Springer-Verlag, New York.

Kushlan, J.A. 1990. Freshwater marshes. P. 324-363, In R.L. Myers and J.J. Ewel (eds.), *Ecosystems of Florida*. Univ. Central Florida Press, Orlando.

Nozaki, Y., D.J. DeMaster, D.M. Lewis, and K.K. Turekian. 1978. Atmospheric Pb-210 fluxes determined from soil profiles. Journal of Geophysical Research 83:4047-4051.

Oldfield, F. and P.G. Appleby. 1985. Empirical testing of ^{210}Pb-dating models for lake sediments. P. 93-124, In E.Y. Haworth and J.W.G. Lund (eds.), *Lake sediments and environmental history*. U. Minnesota Press, Minneapolis.

Rood, B.E. 1993. Spatial and temporal distribution of mercury and other metals in Florida Everglades and Savannas marsh soils. Ph.D. thesis, University of Florida, Gainesville, FL. 180 p.

Schelske, C.L., D.J. Conley, E.F. Stoermer, T.L. Newberry and C.D. Campbell. 1986. Biogenic silica and phosphorus accumulation in sediments as indices of eutrophication in the Laurentian Great Lakes. Hydrobiologia 143: 79-86.

Schelske, C.L., A. Peplow, M. Brenner, and C.N. Spencer. 1994. Low-background gamma counting: applications for ^{210}Pb dating of sediments. Journal of Paleolimnology 10:115-128.

U.S. Environmental Protection Agency. 1986. Test methods for evaluating solid waste. SW846 Method 7471.

Whitehead, D.R. 1981. Late-Pleistocene vegetational changes in north-eastern North Carolina. Ecological Monographs 51:451-471.

Table 4. Physical and chemical variables in Blue Cypress Marsh sediment cores.

Blue Cypress Marsh Core 1A

Depth Interval (cm)	Dry Weight (%)	Bulk Density (g dry cm^{-3} wet)	Organic Matter (mg g^{-1})	Total Carbon (mg g^{-1})	Total Nitrogen (mg g^{-1})	Total Phosphorus (mg g^{-1})
0-2	1.5	0.015	910.6	456.5	34.9	0.44
2-4	4.5	0.046	928.6			0.37
4-6	5.6	0.057	927.8	483.9	34.0	0.31
6-8	5.2	0.053	926.9			0.29
8-10	5.3	0.054	929.7	501.0	35.2	0.28
10-12	5.3	0.054	934.3			0.25
12-14	5.1	0.053	935.7	495.1	33.3	0.26
14-16	5.1	0.052	939.2			0.24
16-18	5.4	0.055	938.3	501.5	36.5	0.21
18-20	5.1	0.052	939.9			0.20
20-22	5.3	0.055	945.3	508.1	36.6	0.18
22-24	4.7	0.048	947.4			0.16
24-26	4.5	0.046	948.8	572.9	39.3	0.17
26-28	6.1	0.062	945.6			0.16
28-30	7.1	0.073	946.3	512.0	34.3	0.16
30-32	8.0					
32-34	7.3	0.075	948.6	518.7	35.0	0.16
34-36	6.8					
36-38	6.3	0.065	955.5	519.5	35.7	0.13
38-40	6.0					
40-42	5.9	0.060	961.0	527.3	36.3	0.10
42-44	5.6					
44-46	6.7	0.069	948.0	531.5	39.8	0.10
46-48	6.3					
48-50	6.2	0.064	943.9	512.3	38.1	0.10
50-52	6.2					
52-54	6.6	0.068	943.4	536.9	41.0	0.10
54-56	7.0					
56-58	7.3	0.075	941.0	528.8	37.4	0.09
58-60	8.1					
60-62	8.2	0.085	937.7	536.1	36.0	0.07
62-64	8.5					
64-66	8.4	0.087	929.4	535.3	34.5	0.07
66-68	9.0					
68-70	10.2	0.106	943.3	554.3	32.0	0.08

Blue Cypress Marsh Core 1B

Depth Interval (cm)	Dry Weight (%)	Bulk Density (g dry cm^{-3} wet)	Organic Matter (mg g^{-1})	Total Carbon (mg g^{-1})	Total Nitrogen (mg g^{-1})	Total Phosphorus (mg g^{-1})
0-2	1.5	0.015	896.8	439.7	30.1	0.42
2-4	3.7	0.037	907.3			0.34
4-6	6.4	0.065	931.8	470.7	21.6	0.22
6-8	5.3	0.054	919.5			0.29
8-10	5.4	0.056	924.3	454.7	26.2	0.51
10-12	5.2	0.053	927.5			0.29
12-14	5.1	0.052	934.0	472.5	28.9	0.27
14-16	5.1	0.052	937.6			0.25
16-18	5.9	0.060	935.7	502.7	33.6	0.22
18-20	5.9	0.060	932.1			0.20
20-22	6.0	0.062	939.9	485.3	32.2	0.20
22-24	6.0	0.061	943.7			0.18
24-26	5.1	0.052	950.2	487.0	31.3	0.13
26-28	4.4	0.045	958.3			0.13
28-30	4.7	0.048	950.0	501.3	33.5	0.17
30-32	5.0					
32-34	4.4	0.045	955.7	498.5	31.5	0.13
34-36	4.5					
36-38	6.7	0.069	950.3	522.2	34.2	0.13
38-40	6.5					
40-42	6.1	0.063	955.8	537.5	36.0	0.12
42-44	5.3					
44-46	4.9	0.050	962.3	510.1	35.1	0.12
46-48	4.7					
48-50	4.3	0.043	963.9	503.5	33.0	0.10
50-52	4.4					
52-54	5.1	0.052	957.0	536.7	36.2	0.10
54-56	6.3					
56-58	6.5	0.067	935.9	523.1	35.7	0.08
58-60	6.1					
60-62	6.2	0.063	950.4	530.3	35.3	0.09
62-64	7.8					
64-66	6.7	0.069	949.7	527.2	35.9	0.07
66-68	7.2					
68-70	7.4	0.076	942.0	529.1	37.5	0.07
70-72	7.8					
72-74	8.0	0.083	931.4	533.6	37.5	0.06
74-76	8.4					
76-78	8.5	0.088	929.8	536.7	34.7	0.06
78-80	8.8					
80-82	8.6	0.089	929.3	532.6	33.2	0.05
82-84	8.6					
84-86	8.6	0.089	934.1	534.0	31.5	0.05
86-88	8.6					
88-90	11.4	0.120	946.4	510.7	28.5	

Blue Cypress Marsh Core 2A

Depth Interval (cm)	Dry Weight (%)	Bulk Density (g dry cm^{-3} wet)	Organic Matter (mg g^{-1})	Total Carbon (mg g^{-1})	Total Nitrogen (mg g^{-1})	Total Phosphorus (mg g^{-1})
0-2	2.3	0.023	896.1	447.5	36.2	0.45
2-4	5.6	0.058	913.2			0.49
4-6	4.8	0.048	913.9	470.4	35.1	0.43
6-8	5.7	0.058	910.7			0.33
8-10	6.2	0.064	909.2	479.5	30.8	0.28
10-12	5.6	0.057	910.3			0.27
12-14	5.4	0.055	912.6	466.1	32.7	0.26
14-16	6.3	0.065	918.5			0.24
16-18	6.3	0.064	920.3	493.9	34.2	0.22
18-20	6.7	0.069	926.9			0.20
20-22	5.9	0.060	930.5	502.5	36.1	0.18
22-24	5.7	0.058	931.6			0.18
24-26	5.8	0.060	934.5	509.6	35.4	0.18
26-28	6.3	0.065	932.7			0.16
28-30	6.5	0.067	937.0	508.4	34.5	0.17
30-32	5.8					
32-34	5.1	0.052	940.9	508.0	34.0	0.19
34-36	5.9					
36-38	5.7	0.059	936.7	520.9	33.5	0.18
38-40	6.0					
40-42	6.0	0.061	939.1	520.6	33.2	0.16
42-44	6.5					
44-46	6.5	0.066	936.3	521.6	32.7	0.15
46-48	7.1					
48-50	7.4	0.076	936.9	526.5	35.1	0.12
50-52	7.9					
52-54	7.6	0.078	931.9	523.3	34.1	0.11
54-56	7.2					
56-58	7.3	0.075	939.0	540.0	35.6	0.10
58-60	7.3					
60-62	7.6	0.079	937.8	532.0	32.2	0.10
62-64	8.0					
64-66	8.1	0.084	933.1	539.0	34.2	0.09
66-68	8.2					
68-70	7.8	0.080	938.2	539.1	31.9	0.08
70-72	8.3					
72-74	8.4	0.087	919.6	535.3	26.3	0.08
74-76	8.8					
76-78	8.8	0.091	911.2	538.2	24.8	0.08
78-80	10.6					

Blue Cypress Marsh Core 2B

Depth Interval (cm)	Dry Weight (%)	Bulk Density (g dry cm^{-3} wet)	Organic Matter (mg g^{-1})	Total Carbon (mg g^{-1})	Total Nitrogen (mg g^{-1})	Total Phosphorus (mg g^{-1})
0-2	2.2	0.022	904.4	434.6	35.7	0.47
2-4	2.2	0.022	917.0			0.49
4-6	3.9	0.039	917.8	469.5	34.4	0.44
6-8	5.3	0.054	911.7			0.47
8-10	5.8	0.059	913.5	470.9	33.4	0.43
10-12	5.9	0.061	918.1			0.36
12-14	5.6	0.057	919.4	479.0	36.2	0.31
14-16	3.9	0.040	929.4			0.26
16-18	4.2	0.043	929.9	499.8	36.5	0.24
18-20	4.3	0.044	928.4			0.23
20-22	5.1	0.052	927.2	483.7	33.5	0.20
22-24	5.5	0.056	924.1			0.23
24-26	5.3	0.054	929.7	492.2	33.6	0.19
26-28	5.0	0.051	932.3			0.13
28-30	4.8	0.049	938.2	509.4	33.2	0.21
30-32	4.4					
32-34	4.3	0.044	942.8	504.5	33.8	0.16
34-36	4.5					
36-38	4.3	0.044	948.3	514.0	31.2	0.14
38-40	5.2					
40-42	6.9	0.071	941.8	521.8	35.0	0.14
42-44	6.9					
44-46	7.2	0.074	941.3	519.8	34.9	0.11
46-48	7.3					
48-50	7.3	0.076	933.1	524.0	35.4	0.10
50-52	7.6					
52-54	8.3	0.086	929.3	524.0	33.6	0.09
54-56	8.2					
56-58	7.5	0.078	933.1	539.9	29.9	0.09
58-60	8.3					
60-62	8.3	0.086	931.7	536.2	32.6	0.09
62-64	8.1					
64-66	8.3	0.086	930.1	537.5	31.2	0.06
66-68	8.4					
68-70	8.4	0.087	928.3	543.2	29.4	0.06
70-72	8.2					
72-74	8.9	0.093	916.3	532.9	24.8	0.05
74-76	8.9					
76-78	8.6	0.089	913.8	529.6	26.9	0.04
78-80	9.1					
80-82	9.7	0.101	905.2	526.7	26.9	0.04
82-84	10.0					
84-86	10.2	0.106	910.3	543.6	27.1	0.04
86-88	12.5					
88-90	12.8	0.135	900.5	533.0	25.4	0.04

Blue Cypress Marsh Core 3A

Depth Interval (cm)	Dry Weight (%)	Bulk Density (g dry cm^{-3} wet)	Organic Matter (mg g^{-1})	Total Carbon (mg g^{-1})	Total Nitrogen (mg g^{-1})	Total Phosphorus (mg g^{-1})
0-2	0.9	0.009	844.7	401.6	46.0	2.67
2-4	1.1	0.011	875.1			2.61
4-6	2.0	0.020	875.1	410.0	44.8	2.57
6-8	2.1	0.021	886.2			2.35
8-10	2.4	0.024	886.4	427.9	45.0	2.51
10-12	3.8	0.039	931.8			0.99
12-14	7.8	0.080	935.7	462.4	19.7	0.73
14-16	9.8	0.102	923.7			0.62
16-18	10.0	0.105	920.1	485.1	39.8	0.42
18-20	11.1	0.116	907.6			0.27
20-22	8.4	0.087	920.6	494.9	37.2	0.24
22-24	8.0	0.083	925.9			0.29
24-26	8.0	0.083	929.9	504.3	38.9	0.22
26-28	5.8	0.060	936.2			0.24
28-30	6.0	0.062	936.5	510.8	39.2	0.22
30-32	6.5					0.22
32-34	7.1	0.073	932.7	509.3	34.2	0.19
34-36	7.4					
36-38	8.7	0.091	920.1	511.0	35.6	0.17
38-40	9.1					
40-42	9.6	0.100	920.3	510.5	35.8	0.14
42-44	9.4					
44-46	9.2	0.096	931.5	527.9	36.7	0.07
46-48	8.6					
48-50	9.6	0.099	940.5	527.8	35.4	0.10
50-52	7.9					
52-54	7.5	0.078	942.3	534.5	33.9	0.09
54-56	8.4					
56-58	9.7	0.101	934.1	533.7	34.1	0.09
58-60	9.2					
60-62	10.1	0.106	915.2	529.8	32.1	0.09
62-64	11.3					
64-66	11.0	0.115	896.3	532.8	31.9	0.09
66-68	11.4					
68-70	12.7	0.134	889.0	531.7	26.3	0.06
70-72	12.3					

Blue Cypress Marsh Core 3B

Depth Interval (cm)	Dry Weight (%)	Bulk Density (g dry cm^{-3} wet)	Organic Matter (mg g^{-1})	Total Carbon (mg g^{-1})	Total Nitrogen (mg g^{-1})	Total Phosphorus (mg g^{-1})
0-2	0.5	0.005	817.2	392.5	40.8	2.01
2-4	1.3	0.013	871.4			1.92
4-6	2.1	0.022	892.7	441.7	42.4	1.73
6-8	2.5	0.026	884.5			1.80
8-10	2.5	0.026	887.6	434.9	43.7	1.71
10-12	3.7	0.037	894.1			1.23
12-14	8.7	0.090	901.7	476.4	35.6	0.33
14-16	9.5	0.098	907.4			0.29
16-18	8.3	0.086	900.7	481.9	35.1	0.24
18-20	7.1	0.073	912.4			0.18
20-22	6.3	0.065	916.9	473.7	36.1	0.16
22-24	7.5	0.077	927.8			0.15
24-26	6.7	0.068	919.6	487.0	36.9	0.13
26-28	7.6	0.078	931.7			0.14
28-30	6.7	0.069	924.2	517.3	37.4	0.12
30-32	6.6					
32-34	6.7	0.069	928.3	514.0	38.3	0.13
34-36	7.5					
36-38	8.0	0.082	923.3	521.4	35.9	0.09
38-40	9.1					
40-42	8.5	0.088	920.3	536.1	36.9	0.08
42-44	8.1					
44-46	7.5	0.077	921.7	517.3	33.9	0.07
46-48	7.0					
48-50	7.5	0.077	929.3	547.0	34.5	0.07
50-52	7.8					
52-54	7.9	0.082	931.8	538.4	36.7	0.05
54-56	9.2					
56-58	7.5	0.078	925.4	511.5	31.6	0.05
58-60	7.6					
60-62	8.7	0.090	924.6	534.7	36.2	0.05
62-64	9.6					
64-66	10.0	0.105	898.0	522.3	32.4	0.05
66-68	10.8					
68-70	11.1	0.116	882.6	531.9	28.9	0.04
70-72	13.0					
72-74	12.5	0.132	878.0	547.7	25.1	0.02
74-76	11.4					
76-78	12.1	0.128	877.6	539.7	26.7	0.02
78-80	10.3					
80-82	9.7	0.100	899.9	528.8	30.6	0.00
82-84	9.3					
84-86	9.2	0.096	913.1	548.9	34.4	0.01

Blue Cypress Marsh Core 2-XII-93-1

Depth Interval (cm)	Dry Weight (%)	Bulk Density (g dry cm^{-3} wet)	Organic Matter (mg g^{-1})	Total Carbon (mg g^{-1})	Total Nitrogen (mg g^{-1})	Total Phosphorus (mg g^{-1})
0-4	1.8	0.018	860.7	412.0	38.7	1.50
4-8	2.3	0.023	873.6	423.8	38.6	1.41
8-12	3.6	0.036	888.1	456.7	42.7	0.80
12-16	7.3	0.075	899.3	491.2	40.6	0.27
16-20	6.3	0.065	900.8	487.8	37.2	0.18
20-24	6.5	0.067	909.6	502.3	39.1	0.18
24-28	5.5	0.056	918.7	520.3	37.3	0.14
28-32	5.2	0.053	926.4	526.7	36.4	0.12
32-36	5.9	0.060	929.5	527.6	37.5	0.11
36-40	6.8	0.070	929.5	516.8	35.0	0.10
40-44	5.9	0.061	922.3	526.2	30.0	0.09
44-48	6.1	0.063	914.7	541.5	37.1	0.08
48-52	6.0	0.061	923.1	502.6	31.6	0.08
52-56	6.5	0.067	927.8	557.9	35.3	0.06
56-60	6.5	0.067	922.1	530.8	37.8	0.07
60-64	7.0	0.072	923.1	534.5	31.2	0.06
64-68	7.8	0.081	894.4	512.8	26.4	0.07
68-72	8.1	0.083	892.5	526.2	26.5	0.07
72-76	10.9	0.114	864.0	532.6	27.6	0.07
76-80	12.5	0.132	867.2	544.4	23.3	0.05
80-84	11.0	0.115	894.7	545.1	22.5	0.03

Blue Cypress Marsh Core 2-XII-93-2

Depth Interval (cm)	Dry Weight (%)	Bulk Density (g dry cm^{-3} wet)	Organic Matter (mg g^{-1})	Total Carbon (mg g^{-1})	Total Nitrogen (mg g^{-1})	Total Phosphorus (mg g^{-1})
0-4	1.6	0.016	923.8	485.8	36.8	0.97
4-8	4.4	0.045	891.6	502.6	37.4	0.38
8-12	5.2	0.054	909.1	511.8	39.6	0.32
12-16	6.7	0.069	924.6	505.4	36.5	0.30
16-20	5.2	0.053	931.9	518.0	42.1	0.24
20-24	5.3	0.054	930.3	513.4	38.6	0.19
24-28	5.8	0.059	920.9	518.0	37.2	0.16
28-32	6.1	0.062	922.1	527.2	37.9	0.16
32-36	7.2	0.074	927.0	509.0	38.0	0.16
36-40	6.2	0.063	929.2	530.1	41.0	0.15
40-44	6.2	0.064	941.0	529.9	37.8	0.13
44-48	7.3	0.075	940.7	514.8	37.1	0.11
48-52	7.8	0.080	937.9	529.0	37.2	0.12
52-56	7.7	0.080	931.9	536.0	37.7	0.09
56-60	8.2	0.084	932.1	528.5	39.9	0.09
60-64	8.4	0.087	927.1	535.6	37.6	0.08
64-68	8.3	0.085	922.4	542.5	35.9	0.08
68-72	8.3	0.085	910.4	545.2	36.6	0.07
72-76	7.8	0.080	932.0	558.8	35.1	0.07
76-80	8.5	0.088	921.3	539.2	30.5	0.07
80-84	9.2	0.095	913.8	539.4	34.1	0.07

Blue Cypress Marsh Core 2-XII-93-3

Depth Interval (cm)	Dry Weight (%)	Bulk Density (g dry cm^{-3} wet)	Organic Matter (mg g^{-1})	Total Carbon (mg g^{-1})	Total Nitrogen (mg g^{-1})	Total Phosphorus (mg g^{-1})
0-4	3.8	0.039	934.8	496.1	31.3	0.42
4-8	6.3	0.065	931.5	499.5	32.0	0.37
8-12	6.3	0.065	943.2	519.5	34.5	0.29
12-16	5.9	0.061	941.2	522.1	36.8	0.26
16-20	5.6	0.057	944.8	519.6	37.2	0.25
20-24	5.5	0.056	952.0	535.0	36.0	0.21
24-28	6.3	0.065	947.9	531.4	37.4	0.18
28-32	6.3	0.065	952.4	524.5	37.9	0.22
32-36	6.1	0.063	959.2	532.3	36.7	0.20
36-40	6.8	0.070	959.3	543.3	41.3	0.18
40-44	6.5	0.067	954.7	545.5	39.2	0.14
44-48	6.7	0.069	952.8	534.0	41.7	0.13
48-52	7.1	0.073	953.3	549.5	42.0	0.11
52-56	7.5	0.077	948.6	531.2	34.7	0.11
56-60	7.5	0.077	946.8	515.4	31.3	0.10
60-64	7.6	0.079	948.6	551.7	35.0	0.09
64-68	7.6	0.078	948.2	545.4	34.1	0.09
68-72	7.9	0.082	938.9	553.7	32.5	0.09
72-76	8.1	0.084	936.4	544.1	31.7	0.09

Blue Cypress Marsh Core 2-XII-93-4

Depth Interval (cm)	Dry Weight (%)	Bulk Density (g dry cm^{-3} wet)	Organic Matter (mg g^{-1})	Total Carbon (mg g^{-1})	Total Nitrogen (mg g^{-1})	Total Phosphorus (mg g^{-1})
0-4	2.7	0.028	931.6	466.2	34.2	0.38
4-8	5.6	0.057	940.6	499.2	32.2	0.28
8-12	5.8	0.059	939.3	504.8	32.7	0.26
12-16	6.0	0.062	943.7	505.3	36.9	0.18
16-20	5.9	0.060	947.1	517.9	41.0	0.22
20-24	5.8	0.060	943.1	511.7	35.2	0.17
24-28	6.2	0.063	946.3	526.5	39.9	0.15
28-32	5.8	0.059	944.4	511.2	40.2	0.16
32-36	5.1	0.052	949.6	531.6	35.0	0.15
36-40	4.9	0.050	951.1	522.2	33.4	0.13
40-44	5.0	0.051	959.4	539.6	35.2	0.12
44-48	5.0	0.051	957.7	529.8	33.3	0.11
48-52	5.0	0.051	957.4	531.6	37.8	0.12
52-56	6.1	0.062	950.2	527.0	37.3	0.13
56-60	6.9	0.070	941.2	521.5	36.8	0.11
60-64	6.5	0.067	949.0	536.1	39.0	0.12
64-68	7.7	0.079	937.2	540.6	37.6	0.13
68-72	7.8	0.081	938.0	547.4	36.9	0.11

Blue Cypress Marsh Core 2-XII-93-5

Depth Interval (cm)	Dry Weight (%)	Bulk Density (g dry cm^{-3} wet)	Organic Matter (mg g^{-1})	Total Carbon (mg g^{-1})	Total Nitrogen (mg g^{-1})	Total Phosphorus (mg g^{-1})
0-4	2.4	0.025	908.7	469.5	32.7	0.53
4-8	4.1	0.042	913.8	500.6	36.1	0.40
8-12	4.1	0.042	938.1	501.8	36.6	0.32
12-16	4.6	0.047	937.4	506.6	35.0	0.36
16-20	4.9	0.050	937.4	514.6	34.7	0.31
20-24	5.5	0.056	954.3	510.5	36.9	0.24
24-28	5.6	0.057	948.1	519.7	34.3	0.22
28-32	5.9	0.061	955.8	519.8	34.4	0.20
32-36	5.6	0.057	960.5	537.4	35.9	0.20
36-40	5.2	0.053	961.9	532.3	37.4	0.21
40-44	4.8	0.049	961.5	531.5	37.2	0.16
44-48	5.8	0.059	957.4	545.2	36.8	0.15
48-52	6.4	0.066	951.7	545.2	38.0	0.15
52-56	7.0	0.072	949.6	546.6	36.0	0.14
56-60	7.7	0.080	937.2	536.5	35.8	0.13
60-64	7.2	0.074	940.2	536.4	34.4	0.12
64-68	7.7	0.080	941.9	562.4	37.8	0.12
68-72	7.8	0.081	938.1	549.3	37.3	0.11
72-76	7.9	0.082	934.3	561.2	34.4	0.10
76-80	7.5	0.078	926.4	542.2	33.9	0.11
80-84	7.2	0.074	929.8	547.6	35.9	0.11

Blue Cypress Marsh Core 2-XII-93-6

Depth Interval (cm)	Dry Weight (%)	Bulk Density (g dry cm^{-3} wet)	Organic Matter (mg g^{-1})	Total Carbon (mg g^{-1})	Total Nitrogen (mg g^{-1})	Total Phosphorus (mg g^{-1})
0-4	1.6	0.016	948.9	472.4	27.7	0.53
4-8	2.5	0.025	933.5	490.7	35.0	0.58
8-12	4.7	0.048	927.0	505.8	39.7	0.34
12-16	5.4	0.055	926.0	504.0	38.2	0.28
16-20	4.9	0.050	926.1	510.7	36.9	0.25
20-24	4.6	0.047	927.2	511.6	42.1	0.26
24-28	5.0	0.051	931.5	509.3	36.1	0.24
28-32	5.8	0.059	924.9	521.6	38.5	0.26
32-36	5.0	0.051	928.0	511.1	38.4	0.20
36-40	3.7	0.037	941.0	516.7	35.3	0.18
40-44	4.0	0.040	939.7	511.0	34.1	0.16
44-48	3.6	0.036	952.1	526.9	35.2	0.14
48-52	4.2	0.043	950.5	517.0	35.4	0.13
52-56	5.9	0.061	954.3	552.6	39.0	0.10
56-60	7.3	0.075	950.2	541.8	38.2	0.11
60-64	6.2	0.064	943.5	535.9	34.4	0.10
64-68	6.6	0.067	930.5	543.0	36.7	0.09
68-72	6.5	0.066	941.2	542.7	36.9	0.11
72-76	6.3	0.065	940.4	540.2	34.9	0.07
76-80	6.9	0.071	928.9	513.3	33.7	0.10
80-84	6.9	0.071	936.9	543.7	32.3	0.07
84-88	6.9	0.071	940.6	547.2	30.6	0.07
88-92	7.1	0.073	949.7	541.5	33.0	0.09

Blue Cypress Marsh Core 21-I-94-7

Depth Interval (cm)	Dry Weight (%)	Bulk Density (g dry cm^{-3} wet)	Organic Matter (mg g^{-1})	Total Carbon (mg g^{-1})	Total Nitrogen (mg g^{-1})	Total Phosphorus (mg g^{-1})
0-4	0.6	0.006	902.4	442.4	28.9	1.56
4-8	2.4	0.024	893.5	565.8	24.9	1.53
8-12	2.5	0.025	906.3	479.9	28.3	1.55
12-16	4.6	0.047	928.9	484.9	30.0	0.70
16-20	5.3	0.054	926.8	493.7	31.1	0.56
20-24	5.4	0.055	940.2	493.3	31.6	0.47
24-28	7.0	0.072	933.9	503.9	33.6	0.46
28-32	7.6	0.078	938.1	527.0	36.4	0.43
32-36	6.9	0.071	941.4	525.4	35.4	0.40
36-40	5.7	0.059	940.9	532.6	38.6	0.34
40-44	6.3	0.065	940.3	528.6	34.2	0.29
44-48	6.3	0.065	942.5	512.4	34.7	0.28
48-52	6.9	0.071	939.9	529.9	35.6	0.28
52-56	6.7	0.069	939.4	517.2	38.0	0.30
56-60	6.5	0.067	939.3	527.6	37.4	0.30
60-64	6.7	0.069	938.1	533.6	39.7	0.28
64-68	7.0	0.072	947.2	541.8	38.4	0.26
68-72	8.0	0.083	939.6	541.8	39.8	0.25
72-76	7.9	0.082	943.8	533.6	39.7	0.20
76-80	8.2	0.084	947.6	541.8	34.1	0.16
80-84	8.7	0.090	941.0	544.8	36.9	0.15
84-88	8.5	0.088	943.2	538.3	33.4	0.13
88-92	8.5	0.088	950.1	527.8	35.2	0.11

Blue Cypress Marsh Core 21-I-94-8

Depth Interval (cm)	Dry Weight (%)	Bulk Density (g dry cm^{-3} wet)	Organic Matter (mg g^{-1})	Total Carbon (mg g^{-1})	Total Nitrogen (mg g^{-1})	Total Phosphorus (mg g^{-1})
0-4	14.2	0.151	889.0	468.3	33.8	0.74
4-8	13.1	0.139	889.7	487.5	39.4	0.61
8-12	10.6	0.110	901.4	489.7	41.0	0.48
12-16	9.5	0.099	900.1	492.8	40.3	0.54
16-20	9.2	0.096	924.2	518.3	42.3	0.22
20-24	9.0	0.093	932.2	518.3	37.9	0.20
24-28	9.4	0.098	933.2	527.4	37.3	0.17
28-32	9.9	0.103	935.6	535.1	40.3	0.17
32-36	9.7	0.100	935.3	531.6	38.7	0.15
36-40	9.4	0.098	937.0	546.2	37.0	0.15
40-44	9.1	0.094	936.8	538.5	36.1	0.14
44-48	9.2	0.096	933.7	539.4	34.8	0.15
48-52	8.7	0.090	933.8	532.7	36.8	0.15
52-56	8.8	0.091	935.2	544.4	40.3	0.12
56-60	9.6	0.100	924.7	543.6	38.0	0.11
60-64	9.4	0.097	940.5	541.3	36.0	0.10

Blue Cypress Marsh Core 21-I-94-9

Depth Interval (cm)	Dry Weight (%)	Bulk Density (g dry cm^{-3} wet)	Organic Matter (mg g^{-1})	Total Carbon (mg g^{-1})	Total Nitrogen (mg g^{-1})	Total Phosphorus (mg g^{-1})
0-4	1.4	0.014	878.2	448.7	38.3	1.75
4-8	1.9	0.019	895.0	472.0	35.9	1.48
8-12	1.9	0.019	901.8	474.2	36.0	1.02
12-16	1.8	0.019	903.3	467.4	35.5	0.89
16-20	2.0	0.020	909.8	511.5	35.2	0.75
20-24	2.0	0.020	906.0	471.6	38.5	0.84
24-28	3.9	0.039	877.2	470.0	35.3	0.61
28-32	11.8	0.125	789.8	403.4	32.5	0.71
32-36	8.2	0.085	880.4	486.4	35.1	0.18
36-40	8.2	0.085	927.1	538.2	37.5	0.25
40-44	8.8	0.091	945.7	539.4	34.4	0.15
44-48	8.6	0.089	944.4	534.5	35.4	0.11
48-52	8.0	0.082	947.0	560.1	40.1	0.10
52-56	8.2	0.085	943.5	538.3	33.5	0.09
56-60	9.6	0.099	943.1	552.0	39.0	0.09

Blue Cypress Marsh Core 8-II-94-10

Depth Interval (cm)	Dry Weight (%)	Bulk Density (g dry cm^{-3} wet)	Organic Matter (mg g^{-1})	Total Carbon (mg g^{-1})	Total Nitrogen (mg g^{-1})	Total Phosphorus (mg g^{-1})
0-4	5.2	0.053	682.1	381.0	26.4	0.99
4-8	7.0	0.072	684.6	366.4	26.3	0.68
8-12	7.9	0.082	676.1	357.7	25.1	0.70
12-16	8.6	0.089	680.2	369.8	28.9	0.53
16-20	8.8	0.092	658.1	364.9	28.8	0.51
20-24	8.4	0.087	671.3	368.1	26.1	0.60
24-28	8.7	0.091	658.9	369.0	27.7	0.73
28-32	8.2	0.085	673.1	367.8	27.6	0.72
32-36	8.3	0.086	673.2	378.9	30.4	0.50
36-40	8.9	0.093	631.0	366.0	28.1	0.50
40-44	16.0	0.174	390.9	216.6	17.0	0.51
44-48	14.5	0.157	455.0	245.0	19.3	0.61
48-52	11.4	0.120	607.6	353.2	23.2	0.52
52-56	12.0	0.128	580.9	327.3	21.4	0.55
56-60	11.7	0.124	633.0	362.8	26.2	0.48
60-64	13.7	0.147	528.8	247.5	19.1	0.44
64-68	13.9	0.149	534.3	253.1	18.4	0.57
68-72	13.2	0.142	559.5	303.5	23.1	0.46
72-76	19.0	0.212	430.3	239.2	14.9	0.45
76-80	12.8	0.136	666.7	390.8	24.1	0.34
80-84	18.1	0.198	650.0	389.8	23.6	0.58
84-88	13.8	0.148	683.0	395.0	27.5	0.23
88-92	12.9	0.138	698.8	417.9	26.4	0.22

Table 5. Isotopes in Blue Cypress Marsh sediments.

Core 1A Isotopes

Depth (cm)	Mid-depth (cm)	Total ^{210}Pb (dpm/g dry)	^{226}Ra (dpm/g dry)	^{137}Cs (dpm/g dry)
0-4	2	13.26	1.02	3.01
8-10	9	14.99	0.46	3.49
14-16	15	13.38	0.11	3.23
18-20	19	8.90	0.51	2.70
22-24	23	8.57	0.22	2.84
28-30	29	5.38	0.32	2.66
34-36	35	1.71	0.56	1.90
40-42	41	1.34	1.10	1.62
44-46	45	1.65	0.98	1.72
48-50	49	0.04	0.66	1.67
52-54	53	-0.11	0.54	1.56
56-58	57	0.49	0.77	1.28
62-64	63	0.10	0.85	1.07

Core 1B Isotopes

Depth (cm)	Mid-depth (cm)	Total ^{210}Pb (dpm/g dry)	^{226}Ra (dpm/g dry)	^{137}Cs (dpm/g dry)
0-4	2	14.26	0.69	1.92
4-6	5	14.15	0.82	2.27
6-8	7	14.90	0.73	3.19
8-10	9	15.27	0.33	3.18
10-12	11	15.80	0.68	2.96
12-14	13	12.42	1.10	2.44
14-16	15	12.48	0.59	2.02
16-18	17	11.40	-0.25	2.65
18-20	19	10.30	0.22	2.46
20-22	21	8.30	1.06	2.25
22-24	23	5.82	0.66	1.93
24-26	25	4.73	0.82	1.66
26-28	27	5.67	0.14	1.42
28-30	29	5.52	0.76	1.52
30-32	31	3.65	0.52	1.56
32-34	33	3.81	0.60	1.83
34-36	35	3.29	0.45	1.22
36-38	37	3.51	0.65	1.44
38-40	39	2.19	0.70	1.52
40-42	41	2.83	0.18	1.68
42-44	43	3.37	0.30	1.17
44-46	45	1.95	0.55	1.16
46-48	47	1.15	1.26	1.36
48-50	49	1.17	0.46	1.24
50-52	51	2.89	0.09	1.52
52-54	53	0.03	0.49	1.30
54-56	55	0.97	0.66	1.37
56-58	57	2.44	0.35	1.31
58-60	59	1.44	0.53	0.99
66-68	67	1.24	0.71	1.32

Core 2A Isotopes

Depth (cm)	Mid-depth (cm)	Total ^{210}Pb (dpm/g dry)	^{226}Ra (dpm/g dry)	^{137}Cs (dpm/g dry)
0-4	2	4.98	1.48	2.54
4-6	5	12.82	1.29	3.48
8-10	9	12.88	0.81	4.67
12-14	13	12.20	0.22	5.61
18-20	19	11.31	0.64	4.32
22-24	23	4.83	0.48	2.51
28-30	29	3.92	0.70	1.78
32-34	33	3.59	0.63	1.80
38-40	39	2.81	0.43	1.99
46-48	47	1.06	0.77	1.26
52-54	53	0.14	0.45	0.54
58-60	59	0.60	0.47	0.48
66-68	67	0.89	0.42	0.41

Core 2B Isotopes

Depth (cm)	Mid-depth (cm)	Total ^{210}Pb (dpm/g dry)	^{226}Ra (dpm/g dry)	^{137}Cs (dpm/g dry)
0-4	2	8.35	1.64	2.39
4-6	5	13.59	0.54	4.40
6-8	7	12.99	0.55	5.27
8-10	9	13.04	0.76	4.97
10-12	11	10.84	0.69	4.68
12-14	13	9.34	1.13	5.04
14-16	15	6.56	0.73	3.48
16-18	17	7.09	0.64	2.99
18-20	19	5.94	1.15	3.07
20-22	21	4.59	0.52	2.38
22-24	23	5.28	0.44	2.18
24-26	25	3.55	0.47	2.18
26-28	27	4.35	0.50	2.12
28-30	29	3.75	0.77	1.98
30-32	31	4.36	0.18	2.04
32-34	33	3.36	0.06	1.79
34-36	35	0.72	0.23	2.23
36-38	37	2.06	0.31	1.63
38-40	39	4.18	0.46	1.35
40-42	41	2.44	0.58	1.54
42-44	43	1.35	0.04	1.04
44-46	45	1.63	0.52	1.32
46-48	47	0.08	0.58	1.19
48-50	49	1.37	0.43	0.78
50-52	51	-0.17	0.51	0.73
52-54	53	1.32	0.69	0.72
54-56	55	1.26	0.16	0.49
62-64	63	0.80	0.48	0.60
66-68	67	1.52	0.58	0.32

Core 3A Isotopes

Depth (cm)	Mid-depth (cm)	Total ^{210}Pb (dpm/g dry)	^{226}Ra (dpm/g dry)	^{137}Cs (dpm/g dry)
0-4	2	4.98	1.48	2.54
4-6	5	12.82	1.29	3.48
8-10	9	12.88	0.81	4.67
12-14	13	12.20	0.22	5.61
18-20	19	11.31	0.64	4.32
22-24	23	4.83	0.48	2.51
28-30	29	3.92	0.70	1.78
32-34	33	3.59	0.63	1.80
38-40	39	2.81	0.43	1.99
46-48	47	1.06	0.77	1.26
52-54	53	0.14	0.45	0.54
58-60	59	0.60	0.47	0.48
66-68	67	0.89	0.42	0.41

Core 3B Isotopes

Depth (cm)	Mid-depth (cm)	Total ^{210}Pb (dpm/g dry)	^{226}Ra (dpm/g dry)	^{137}Cs (dpm/g dry)
0-8	4	10.21	0.88	0.39
8-12	10	15.78	0.58	1.81
12-14	13	25.30	1.78	6.76
14-16	15	21.13	0.96	8.05
16-18	17	13.83	0.86	9.16
18-20	19	9.05	0.89	6.37
20-22	21	7.34	0.81	5.34
22-24	23	6.89	0.66	4.09
24-26	25	7.21	0.89	3.18
26-28	27	5.70	0.46	2.63
28-30	29	4.57	0.89	2.03
30-32	31	2.32	0.62	2.50
32-34	33	2.53	0.63	2.97
34-36	35	2.16	0.63	2.97
36-38	37	2.13	0.68	2.97
38-40	39	0.83	0.52	2.51
40-42	41	0.07	0.93	2.06
42-44	43	1.05	0.71	1.65
44-46	45	1.38	0.69	1.23
46-48	47	0.81	0.85	1.00
48-50	49	0.77	0.86	0.77
50-52	51	0.19	0.73	0.65
52-54	53	0.00	0.16	0.35
54-56	55	-0.97	0.27	0.35
56-58	57	1.38	0.48	0.14
58-60	59	0.34	0.50	0.26
62-64	63	3.63	1.40	0.62

Core 2-XII-93-1

Depth (cm)	Mid-depth (cm)	Total ^{210}Pb (dpm/g dry)	^{226}Ra (dpm/g dry)	^{137}Cs (dpm/g dry)
0-4	2	16.08	3.45	2.35
4-8	6	22.85	1.48	3.10
8-12	10	25.89	1.42	5.07
12-16	14	27.92	0.96	9.02
16-20	18	21.78	1.53	12.17
20-24	22	10.21	0.62	8.13
24-28	26	3.75	0.80	4.21
28-32	30	2.57	0.49	2.20
32-36	34	1.47	0.74	1.13
36-40	38	-0.79	0.38	1.49
40-44	42	0.34	0.25	0.65
44-48	46	1.19	0.22	0.43

Core 2-XII-93-2

Depth (cm)	Mid-depth (cm)	Total ^{210}Pb (dpm/g dry)	^{226}Ra (dpm/g dry)	^{137}Cs (dpm/g dry)
0-4	2	12.38	0.65	1.94
4-8	6	11.90	0.05	2.77
8-12	10	11.25	0.54	3.51
12-16	14	11.11	0.37	3.21
16-20	18	8.40	0.41	3.69
20-24	22	6.41	0.71	2.79
24-28	26	8.04	0.63	2.31
28-32	30	5.22	0.11	2.06
32-36	34	4.26	0.56	2.48
36-40	38	4.23	1.09	2.20
40-44	42	2.24	0.23	2.06
44-48	46	1.34	0.63	1.72
48-52	50	0.79	0.68	1.56
52-56	54	1.22	1.46	1.43
56-60	58	0.43	0.58	0.93
60-64	62	0.68	0.53	0.98
64-68	66	0.31	0.55	0.35

Core 2-XII-93-3

Depth (cm)	Mid-depth (cm)	Total ^{210}Pb (dpm/g dry)	^{226}Ra (dpm/g dry)	^{137}Cs (dpm/g dry)
0-4	2	12.64	0.10	1.94
4-8	6	12.68	0.33	2.57
8-12	10	11.13	0.74	2.71
12-16	14	6.73	0.02	2.42
16-20	18	6.61	0.06	1.53
20-24	22	4.39	-0.51	1.83
24-28	26	5.23	0.37	1.53
28-32	30	2.52	0.02	1.50
32-36	34	3.41	0.34	1.56
36-40	38	0.44	0.25	1.50
40-44	42	0.45	0.68	1.52
44-48	46	0.60	-0.85	1.31
48-52	50	1.20	0.71	1.32
52-56	54	0.81	-0.06	0.89
56-60	58	2.20	0.19	0.93
60-64	62	0.90	0.12	1.00
64-68	66	-0.29	0.99	0.77

Core 2-XII-93-4

Depth (cm)	Mid-depth (cm)	Total ^{210}Pb (dpm/g dry)	^{226}Ra (dpm/g dry)	^{137}Cs (dpm/g dry)
0-4	2	14.79	0.60	2.77
4-8	6	15.74	0.17	3.24
8-12	10	9.54	0.40	1.85
12-16	14	10.58	0.43	2.51
16-20	18	10.00	0.51	2.07
20-24	22	6.58	1.23	1.94
24-28	26	2.52	-0.08	1.39
28-32	30	2.67	0.49	1.31
32-36	34	2.74	0.82	1.67
36-40	38	1.11	0.57	1.71
40-44	42	3.09	-0.30	1.79
44-48	46	-0.25	-0.02	1.77

Core 2-XII-93-5

Depth (cm)	Mid-depth (cm)	Total ^{210}Pb (dpm/g dry)	^{226}Ra (dpm/g dry)	^{137}Cs (dpm/g dry)
0-4	2	20.07	1.05	2.54
4-8	6	20.05	0.72	3.66
8-12	10	13.75	0.86	3.46
12-16	14	17.82	0.70	3.02
16-20	18	15.15	0.75	2.97
20-24	22	6.37	0.29	3.12
24-28	26	5.89	-0.18	2.56
28-32	30	1.00	0.17	1.64
32-36	34	3.18	-0.16	1.90
36-40	38	2.53	0.20	2.00
40-44	42	2.31	1.48	1.97
44-48	46	-0.69	0.62	1.60
48-52	50	0.74	0.72	1.34
52-56	54	0.95	0.49	1.54

Core 2-XII-93-6

Depth (cm)	Mid-depth (cm)	Total ^{210}Pb (dpm/g dry)	^{226}Ra (dpm/g dry)	^{137}Cs (dpm/g dry)
0-4	2	14.64	0.56	1.41
4-8	6	20.74	0.27	2.74
8-12	10	20.07	0.38	5.24
12-16	14	17.38	0.72	4.39
16-20	18	14.60	-0.11	3.89
20-24	22	14.55	0.32	3.52
24-28	26	8.47	0.95	2.94
28-32	30	5.66	0.57	2.04
32-36	34	5.42	0.61	1.92
36-40	38	3.94	-0.13	1.62
40-44	42	2.51	0.83	1.12
44-48	46	3.55	0.74	1.18
48-52	50	2.36	0.27	1.21
52-56	54	2.00	0.14	0.60

Core 21-I-94-7

Depth (cm)	Mid-depth (cm)	Total ^{210}Pb (dpm/g dry)	^{226}Ra (dpm/g dry)	^{137}Cs (dpm/g dry)
0-4	2	4.63	0.17	0.71
4-8	6	6.58	1.08	0.38
8-12	10	7.89	0.45	0.70
12-16	14	6.72	0.93	0.76
16-20	18	10.11	0.92	1.56
20-24	22	7.76	-0.06	1.35
24-28	26	8.95	0.22	1.61
28-32	30	9.81	0.13	1.69
32-36	34	7.96	0.12	1.58
36-40	38	6.56	0.44	1.49
40-44	42	5.66	0.69	1.53
44-48	46	6.06	0.30	1.38
48-52	50	5.91	0.14	1.10

Core 21-I-94-8

Depth (cm)	Mid-depth (cm)	Total ^{210}Pb (dpm/g dry)	^{226}Ra (dpm/g dry)	^{137}Cs (dpm/g dry)
0-4	2	11.59	0.86	6.06
4-8	6	11.68	0.33	7.35
8-12	10	8.66	0.17	4.50
12-16	14	5.60	0.84	1.97
16-20	18	3.25	0.38	1.21
20-24	22	2.28	-0.09	0.82
24-28	26	2.13	0.28	0.55
28-32	30	1.06	0.57	0.66
32-36	34	1.58	0.47	0.68
36-40	38	1.44	0.64	0.40
40-44	42	1.20	0.32	0.32
44-48	46	1.31	0.33	0.40

Core 21-I-94-9

Depth (cm)	Mid-depth (cm)	Total ^{210}Pb (dpm/g dry)	^{226}Ra (dpm/g dry)	^{137}Cs (dpm/g dry)
0-4	2	9.12	1.10	0.70
4-8	6	10.78	1.12	0.74
8-12	10	9.36	0.78	0.51
12-16	14	10.84	1.10	0.43
16-20	18	10.61	0.61	0.65
20-24	22	9.98	0.45	0.63
24-28	26	10.46	0.82	2.40
28-32	30	22.37	1.56	4.14
32-36	34	7.74	0.66	2.23
36-40	38	4.40	0.63	0.58

Core 8-II-94-10

Depth (cm)	Mid-depth (cm)	Total ^{210}Pb (dpm/g dry)	^{226}Ra (dpm/g dry)	^{137}Cs (dpm/g dry)
0-4	2	24.61	3.60	5.15
4-8	6	24.99	3.38	4.73
8-12	10	23.16	2.77	5.08
12-16	14	20.99	2.99	5.01
16-20	18	18.33	2.54	4.68
20-24	22	18.36	2.31	5.16
24-28	26	15.35	2.23	3.87
28-32	30	9.89	2.75	1.81
32-36	34	6.41	1.92	1.27
36-40	38	5.85	1.92	1.06
40-44	42	3.99	1.26	0.79
44-48	46	1.89	1.62	0.48
48-52	50	3.73	1.64	0.58
52-56	54	2.34	2.16	0.52

Table 6. Accumulation rates in Blue Cypress Marsh sediments.

Blue Cypress Marsh Core 1B
Accumulation Rates

Depth (cm)	Age (yr)	Date	Bulk ($g\ cm^{-2}\ yr^{-1}$)	Organic matter	C	N	P
				---------------($mg\ cm^{-2}\ yr^{-1}$)-----------------			
0-4	2.8	1990	0.037	33.4	16.3	1.11	0.013
4-6	6.6	1986	0.034	31.7	16.0	0.88	0.007
6-8	10.4	1982	0.029	26.7	13.4	0.69	0.008
8-10	15.0	1978	0.024	22.2	10.9	0.63	0.012
10-12	20.3	1973	0.020	18.5	9.3	0.55	0.006
12-14	24.9	1968	0.023	21.5	10.9	0.66	0.006
14-16	30.3	1963	0.019	17.8	9.3	0.59	0.005
16-18	37.1	1956	0.018	16.8	9.1	0.60	0.004
18-20	44.7	1948	0.016	14.9	7.9	0.53	0.003
20-22	52.5	1940	0.016	15.0	7.8	0.52	0.003
22-24	58.5	1934	0.020	18.9	9.7	0.64	0.004
24-26	63.0	1930	0.023	21.8	11.2	0.72	0.003
26-28	69.0	1924	0.015	14.4	7.4	0.49	0.002
28-30	76.5	1916	0.013	12.4	6.5	0.44	0.002
30-32	81.4	1911	0.019	18.1	9.5	0.62	0.003
32-34	87.3	1905	0.015	14.3	7.5	0.47	0.002
34-36	94.6	1898	0.016	15.2	8.2	0.53	0.002
36-38	108.0	1885	0.010	9.5	5.2	0.34	0.001
38-40	114.5	1878	0.020	19.1	10.6	0.70	0.003
40-42	130.4	1862	0.008	7.6	4.3	0.29	0.001
42-44	182.5	1810	0.002	1.9	1.0	0.07	0.000

Blue Cypress Marsh Core 2B
Accumulation Rates

Depth (cm)	Age (yr)	Date	Bulk (g cm^{-2} yr^{-1})	Organic matter	C	N	P
				(mg cm^{-2} yr^{-1})			
0-4	1.9	1991	0.046	41.9	20.8	1.61	0.022
4-6	5.1	1988	0.025	23.0	11.8	0.86	0.011
6-8	9.7	1983	0.023	21.0	10.8	0.78	0.011
8-10	15.8	1977	0.020	18.3	9.4	0.67	0.009
10-12	21.9	1971	0.020	18.4	9.5	0.70	0.007
12-14	27.8	1965	0.019	17.5	9.1	0.69	0.006
14-16	31.0	1962	0.025	23.2	12.2	0.91	0.007
16-18	35.2	1958	0.020	18.6	10.0	0.73	0.005
18-20	39.2	1954	0.022	20.4	10.8	0.77	0.005
20-22	43.1	1950	0.027	25.0	13.1	0.90	0.005
22-24	48.9	1944	0.019	17.6	9.3	0.64	0.004
24-26	52.8	1940	0.027	25.1	13.3	0.91	0.005
26-28	58.5	1934	0.018	16.8	9.0	0.60	0.002
28-30	63.7	1929	0.019	17.8	9.7	0.63	0.004
30-32	71.1	1922	0.013	12.2	6.6	0.44	0.002
32-34	77.2	1916	0.014	13.2	7.1	0.47	0.002
34-36	82.6	1910	0.016	15.1	8.1	0.52	0.002
36-38	86.6	1906	0.022	20.9	11.3	0.69	0.003
38-40	108.2	1885	0.005	4.7	2.6	0.17	0.001
40-42	134.4	1858	0.005	4.7	2.6	0.18	0.001
42-44	149.4	1843	0.010	9.4	5.2	0.35	0.001

Blue Cypress Marsh Core 3B
Accumulation Rates

Depth (cm)	Age (yr)	Date	Bulk (g cm^{-2} yr^{-1})	Organic matter	C	N	P
				---------------(mg cm^{-2} yr^{-1})-----------------			
0-8	2.1	1991	0.062	53.7	25.9	2.58	0.113
8-12	4.9	1988	0.036	32.1	15.7	1.57	0.051
12-14	14.8	1978	0.018	16.2	8.6	0.64	0.006
14-16	27.4	1965	0.016	14.5	7.7	0.57	0.005
16-18	37.6	1955	0.017	15.3	8.2	0.60	0.004
18-20	44.7	1948	0.020	18.2	9.6	0.71	0.004
20-22	50.9	1942	0.021	19.3	10.0	0.76	0.003
22-24	59.5	1933	0.018	16.7	8.6	0.66	0.003
24-26	70.5	1922	0.012	11.0	5.8	0.44	0.002
26-28	84.6	1908	0.011	10.3	5.5	0.41	0.002
28-30	99.5	1893	0.009	8.3	4.7	0.34	0.001
30-32	108.2	1885	0.016	14.8	8.3	0.61	0.002
32-34	122.4	1870	0.010	9.3	5.1	0.38	0.001
34-36	143.4	1849	0.007	6.5	3.6	0.26	0.001
36-38	271.7	1721	0.001	0.9	0.5	0.04	0.000

Blue Cypress Marsh Core 2-XII-93-1
Accumulation Rates

Depth (cm)	Age (yr)	Date	Bulk ($g\ cm^{-2}\ yr^{-1}$)	Organic matter	C	N	P
				---------------(mg cm^{-2} yr^{-1})-----------------			
0-4	1.2	1993	0.057	49.1	23.5	2.21	0.085
4-8	4.1	1990	0.032	28.0	13.6	1.24	0.045
8-12	10.1	1984	0.024	21.3	11.0	1.02	0.019
12-16	30.5	1963	0.015	13.5	7.4	0.61	0.004
16-20	58.2	1936	0.009	8.1	4.4	0.33	0.002
20-24	93.5	1900	0.008	7.3	4.0	0.31	0.001
24-28	116.9	1877	0.010	9.2	5.2	0.37	0.001
28-32	157.2	1837	0.005	4.6	2.6	0.18	0.001

Blue Cypress Marsh Core 2-XII-93-2
Accumulation Rates

Depth (cm)	Age (yr)	Date	Bulk ($g\ cm^{-2}\ yr^{-1}$)	Organic matter	C	N	P
				---------------(mg cm^{-2} yr^{-1})-----------------			
0-4	1.4	1992	0.043	39.7	20.9	1.58	0.042
4-8	6.1	1988	0.039	34.8	19.6	1.46	0.015
8-12	11.9	1982	0.037	33.6	18.9	1.47	0.012
12-16	21.5	1972	0.029	26.8	14.7	1.06	0.009
16-20	28.6	1965	0.030	28.0	15.5	1.26	0.007
20-24	34.9	1959	0.034	31.6	17.5	1.31	0.006
24-28	46.9	1947	0.020	18.4	10.4	0.74	0.003
28-32	59.6	1934	0.020	18.4	10.5	0.76	0.003
32-36	76.9	1917	0.017	15.8	8.7	0.65	0.003
36-40	100.6	1893	0.011	10.2	5.8	0.45	0.002
40-44	139.8	1854	0.007	6.6	3.7	0.26	0.001

Blue Cypress Marsh Core 2-XII-93-3
Accumulation Rates

Depth (cm)	Age (yr)	Date	Bulk ($g\ cm^{-2}\ yr^{-1}$)	Organic matter	C	N	P
				---------------(mg cm^{-2} yr^{-1})-----------------			
0-4	4.5	1989	0.034	31.8	16.9	1.06	0.014
4-8	13.8	1980	0.028	26.1	14.0	0.90	0.010
8-12	24.2	1970	0.025	23.6	13.0	0.86	0.007
12-16	32.8	1961	0.028	26.4	14.6	1.03	0.007
16-20	43.4	1951	0.022	20.8	11.4	0.82	0.005
20-24	54.2	1940	0.021	20.0	11.2	0.76	0.004
24-28	74.0	1920	0.013	12.3	6.9	0.49	0.002
28-32	92.6	1901	0.014	13.3	7.3	0.53	0.003
32-36	181.3	1813	0.003	2.9	1.6	0.11	0.001

Blue Cypress Marsh Core 2-XII-93-4
Accumulation Rates

Depth (cm)	Age (yr)	Date	Bulk (g cm^{-2} yr^{-1})	Organic matter	C	N	P
				-----	(mg cm^{-2} yr^{-1})	-----	
0-4	3.6	1990	0.031	28.9	14.5	1.06	0.012
4-8	13.5	1980	0.023	21.6	11.5	0.74	0.006
8-12	21.5	1972	0.030	28.2	15.1	0.98	0.008
12-16	34.3	1960	0.019	17.9	9.6	0.70	0.003
16-20	53.1	1941	0.013	12.3	6.7	0.53	0.003
20-24	72.2	1922	0.012	11.3	6.1	0.42	0.002
24-28	89.8	1904	0.014	13.2	7.4	0.56	0.002
28-32	116.5	1877	0.009	8.5	4.6	0.36	0.001

Blue Cypress Marsh Core 2-XII-93-5
Accumulation Rates

Depth (cm)	Age (yr)	Date	Bulk (g cm^{-2} yr^{-1})	Organic matter	C	N	P
				-----	(mg cm^{-2} yr^{-1})	-----	
0-4	3.6	1990	0.027	24.5	12.7	0.88	0.014
4-8	10.9	1983	0.023	21.0	11.5	0.83	0.009
8-12	16.9	1977	0.028	26.3	14.1	1.02	0.009
12-16	28.6	1965	0.016	15.0	8.1	0.56	0.006
16-20	44.9	1949	0.012	11.2	6.2	0.42	0.004
20-24	56.9	1937	0.019	18.1	9.7	0.70	0.005
24-28	76.8	1917	0.012	11.4	6.2	0.41	0.003
28-32	81.1	1913	0.057	54.5	29.6	1.96	0.011
32-36	105.8	1888	0.009	8.6	4.8	0.32	0.002
36-40	150.6	1843	0.005	4.8	2.7	0.19	0.001

Blue Cypress Marsh Core 2-XII-93-6
Accumulation Rates

Depth (cm)	Age (yr)	Date	Bulk (g cm^{-2} yr^{-1})	Organic matter	C	N	P
				-----	(mg cm^{-2} yr^{-1})	-----	
0-4	1.5	1992	0.045	42.7	21.3	1.25	0.024
4-8	5.0	1989	0.028	26.1	13.7	0.98	0.016
8-12	12.7	1981	0.025	23.2	12.6	0.99	0.008
12-16	22.6	1971	0.022	20.4	11.1	0.84	0.006
16-20	33.6	1960	0.018	16.7	9.2	0.66	0.005
20-24	48.2	1946	0.013	12.1	6.7	0.55	0.003
24-28	61.3	1933	0.016	14.9	8.1	0.58	0.004
28-32	77.4	1916	0.015	13.9	7.8	0.58	0.004
32-36	101.3	1893	0.008	7.4	4.1	0.31	0.002
36-40	139.2	1855	0.004	3.8	2.1	0.14	0.001

Blue Cypress Marsh Core 21-I-94-8
Accumulation Rates

Depth (cm)	Age (yr)	Date	Bulk ($g\ cm^{-2}\ yr^{-1}$)	Organic matter	C	N	P
				($mg\ cm^{-2}\ yr^{-1}$)			
0-4	11.6	1982	0.052	46.2	24.4	1.76	0.038
4-8	29.4	1965	0.031	27.6	15.1	1.22	0.019
8-12	48.0	1946	0.024	21.6	11.8	0.98	0.012
12-16	64.0	1930	0.025	22.5	12.3	1.01	0.014
16-20	79.3	1915	0.025	23.1	13.0	1.06	0.006
20-24	100.8	1893	0.017	15.8	8.8	0.64	0.003
24-28	150.1	1844	0.008	7.5	4.2	0.30	0.001

Blue Cypress Marsh Core 8-II-94-10
Accumulation Rates

Depth (cm)	Age (yr)	Date	Bulk ($g\ cm^{-2}\ yr^{-1}$)	Organic matter	C	N	P
				($mg\ cm^{-2}\ yr^{-1}$)			
0-4	3.2	1991	0.067	45.7	25.5	1.77	0.066
4-8	8.2	1986	0.057	39.0	20.9	1.50	0.039
8-12	14.6	1979	0.051	34.5	18.2	1.28	0.036
12-16	22.4	1972	0.046	31.3	17.0	1.33	0.024
16-20	31.4	1963	0.041	27.0	15.0	1.18	0.021
20-24	43.4	1951	0.029	19.5	10.7	0.76	0.017
24-28	59.2	1935	0.023	15.2	8.5	0.64	0.017
28-32	71.8	1922	0.027	18.2	9.9	0.75	0.019
32-36	83.4	1911	0.030	20.2	11.4	0.91	0.015
36-40	100.6	1893	0.022	13.9	8.1	0.62	0.011
40-44	181.9	1812	0.009	3.5	1.9	0.15	0.005

Table 7. Mercury concentrations in Blue Cypress Marsh sediments.

Depth (cm)	Core 1B Hg (ng/g dry)	Core 3B Hg (ng/g dry)
0-2	129	393
2-4	99	191
4-6	86	126
6-8	116	
8-10	145	141
10-12	151	132
12-14	106	117
14-16	131	114
16-18	93	119
18-20	92	106
20-22	90	149
22-24	71	155
24-26	131	157
26-28	124	120
28-30	64	195
30-32		
32-34	66	136
34-36		
36-38	43	118
38-40		
40-42	69	89
42-44		
44-46	60	
46-48		
48-50		78
50-52		
52-54	79	63
54-56		
56-58	81	66
58-60		
60-62	48	75
62-64		
64-66	44	82
66-68		
68-70	40	
70-72		
72-74	51	59
74-76		
76-78	150	66
78-80		
80-82	48	60
82-84		
84-86	75	70
86-88		
88-90	80	

Table 8. Mercury accumulation rates in Blue Cypress Marsh sediments.

Date	Core 1B Hg ($ng\ cm^{-2}\ yr^{-1}$)	Date	Core 3B Hg ($ng\ cm^{-2}\ yr^{-1}$)
1990	4.22	1991	14.69
1986	2.92	1988	4.93
1982	3.36	1978	2.11
1978	3.48	1965	1.82
1973	3.02	1955	2.02
1968	2.44	1948	2.12
1963	2.49	1942	3.13
1956	1.67	1933	2.79
1948	1.47	1922	1.88
1940	1.44	1908	1.32
1934	1.42	1893	1.75
1930	3.01	1885	2.66
1924	1.86	1870	1.36
1916	0.83	1849	0.89
1911	1.24	1721	0.12
1905	0.99		
1898	0.88		
1885	0.43		
1878	1.12		
1862	0.55		
1810	0.13		

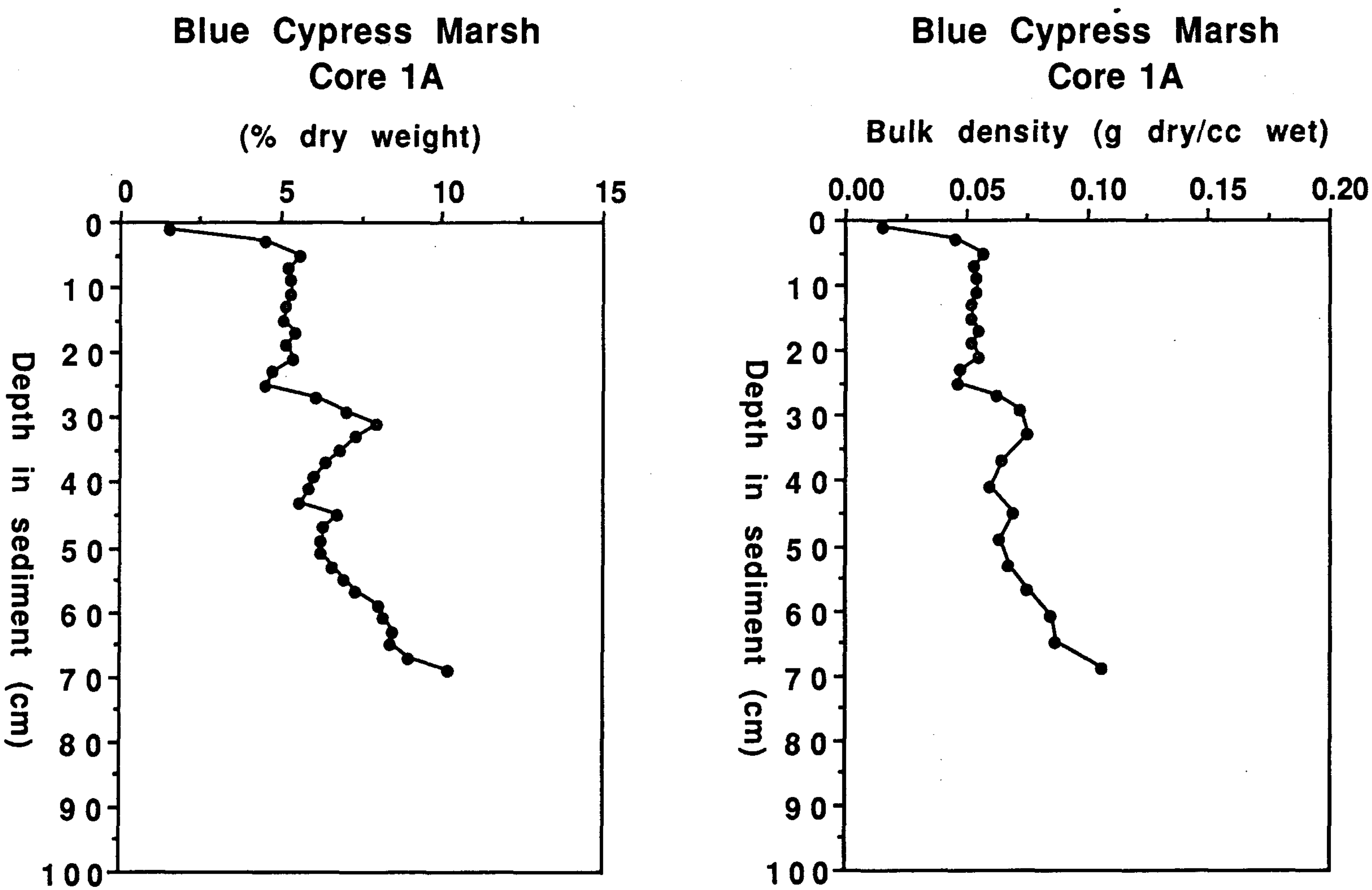


Figure 1. Blue Cypress Marsh Core 1A dry weight (%) and bulk density (g dry cm^{-3} wet).

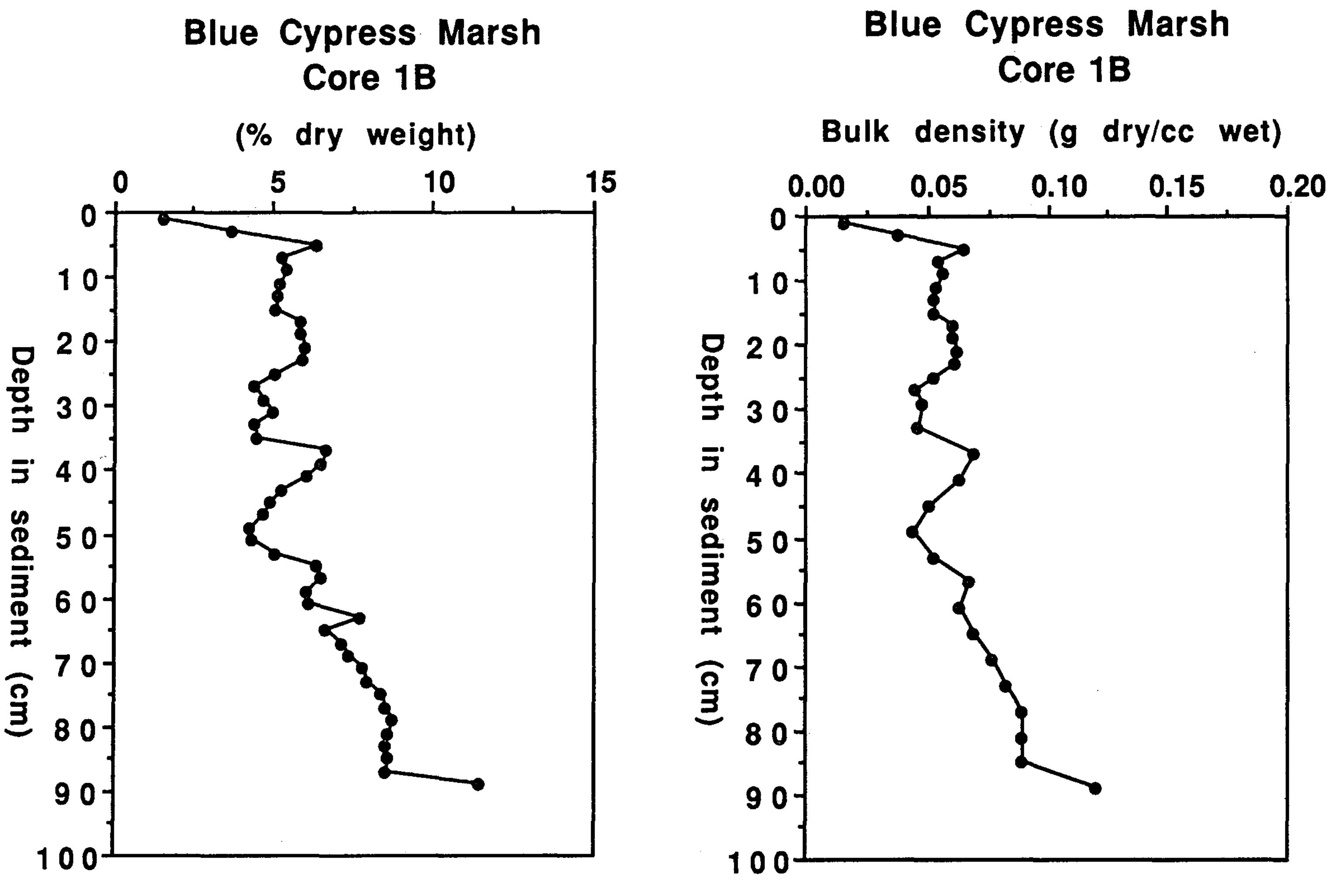


Figure 2. Blue Cypress Marsh Core 1B dry weight (%) and bulk density (g dry cm^{-3} wet).

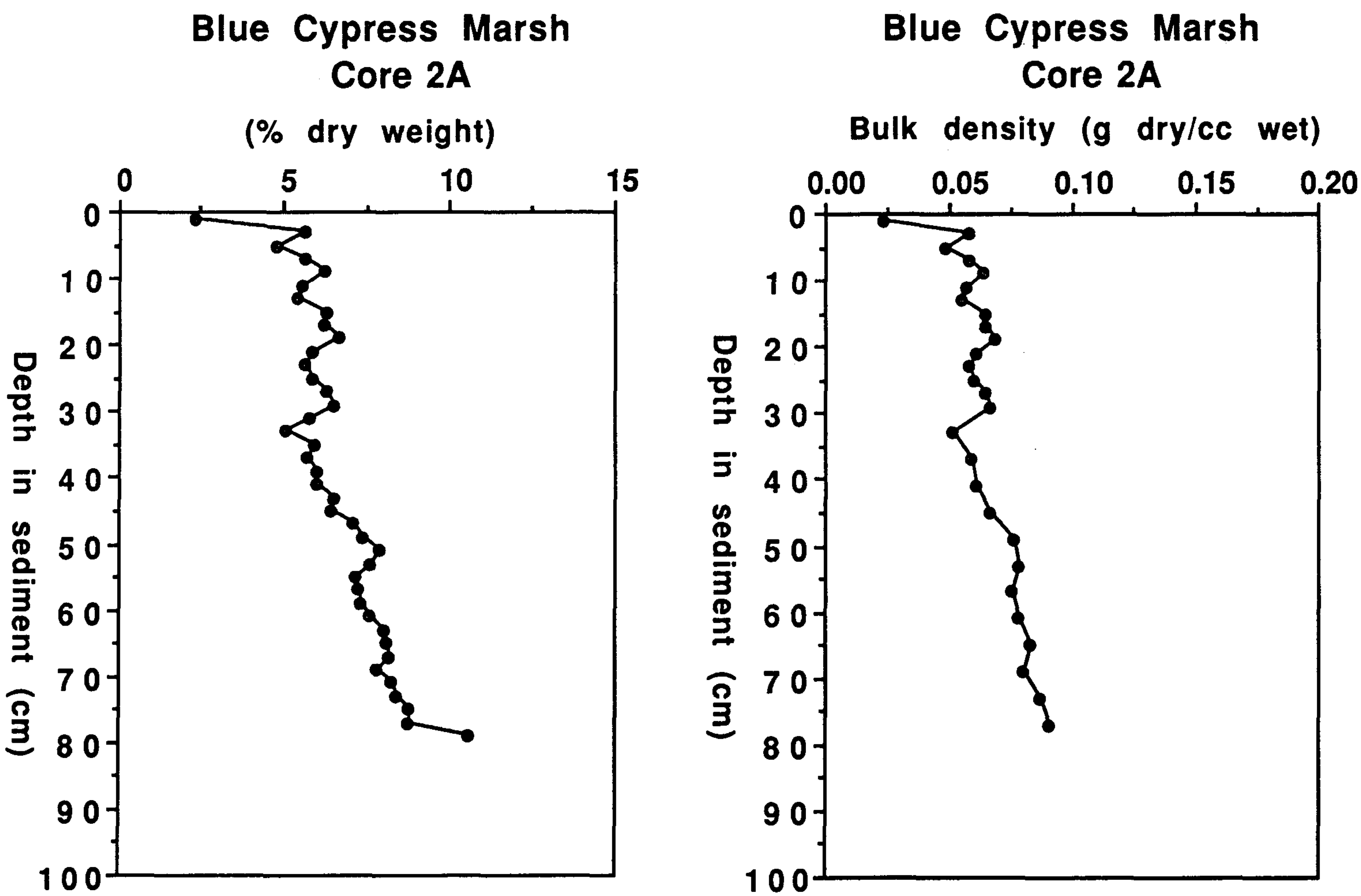


Figure 3. Blue Cypress Marsh Core 2A dry weight (%) and bulk density (g dry cm^{-3} wet).

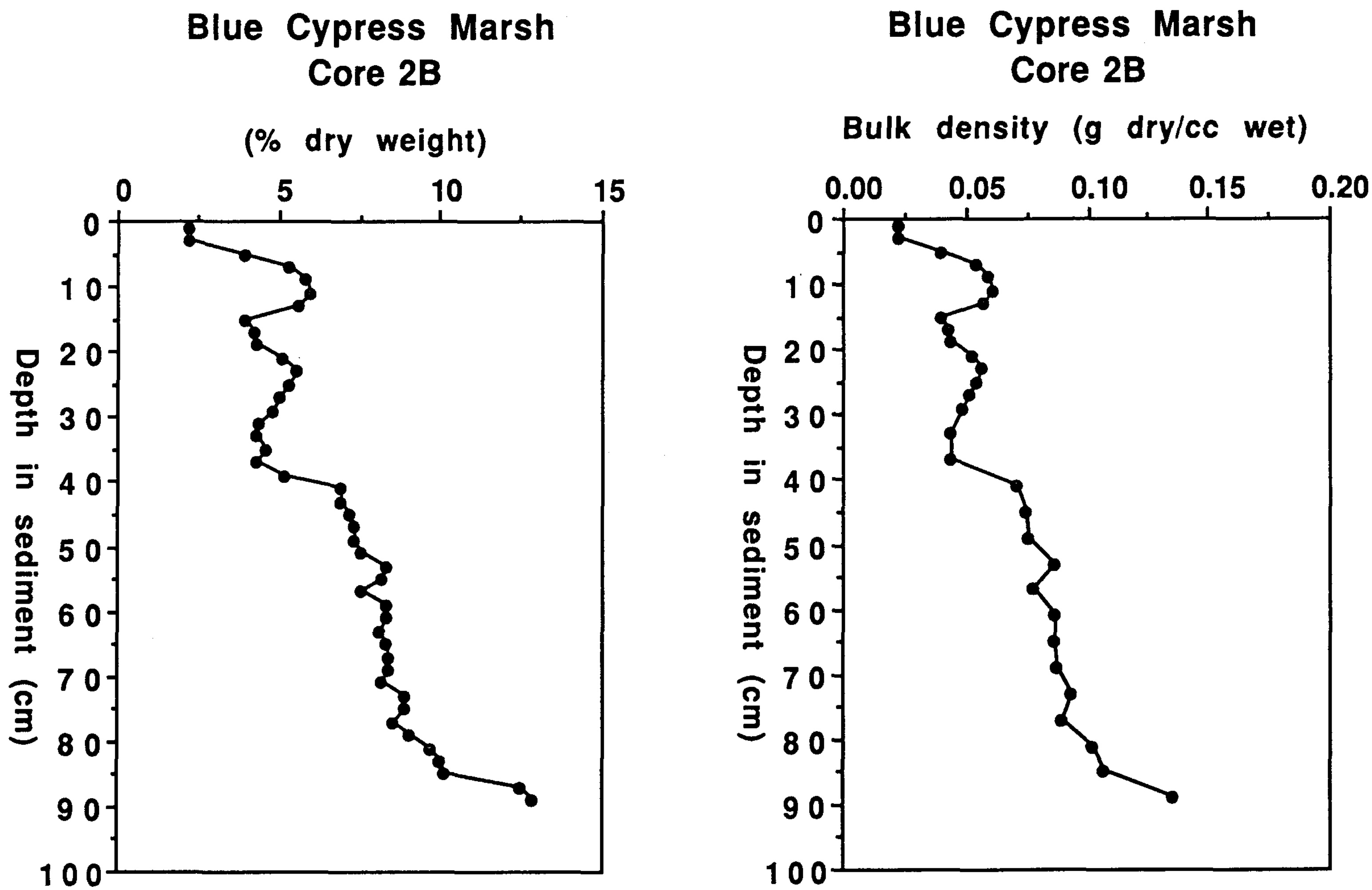


Figure 4. Blue Cypress Marsh Core 2B dry weight (%) and bulk density (g dry cm^{-3} wet).

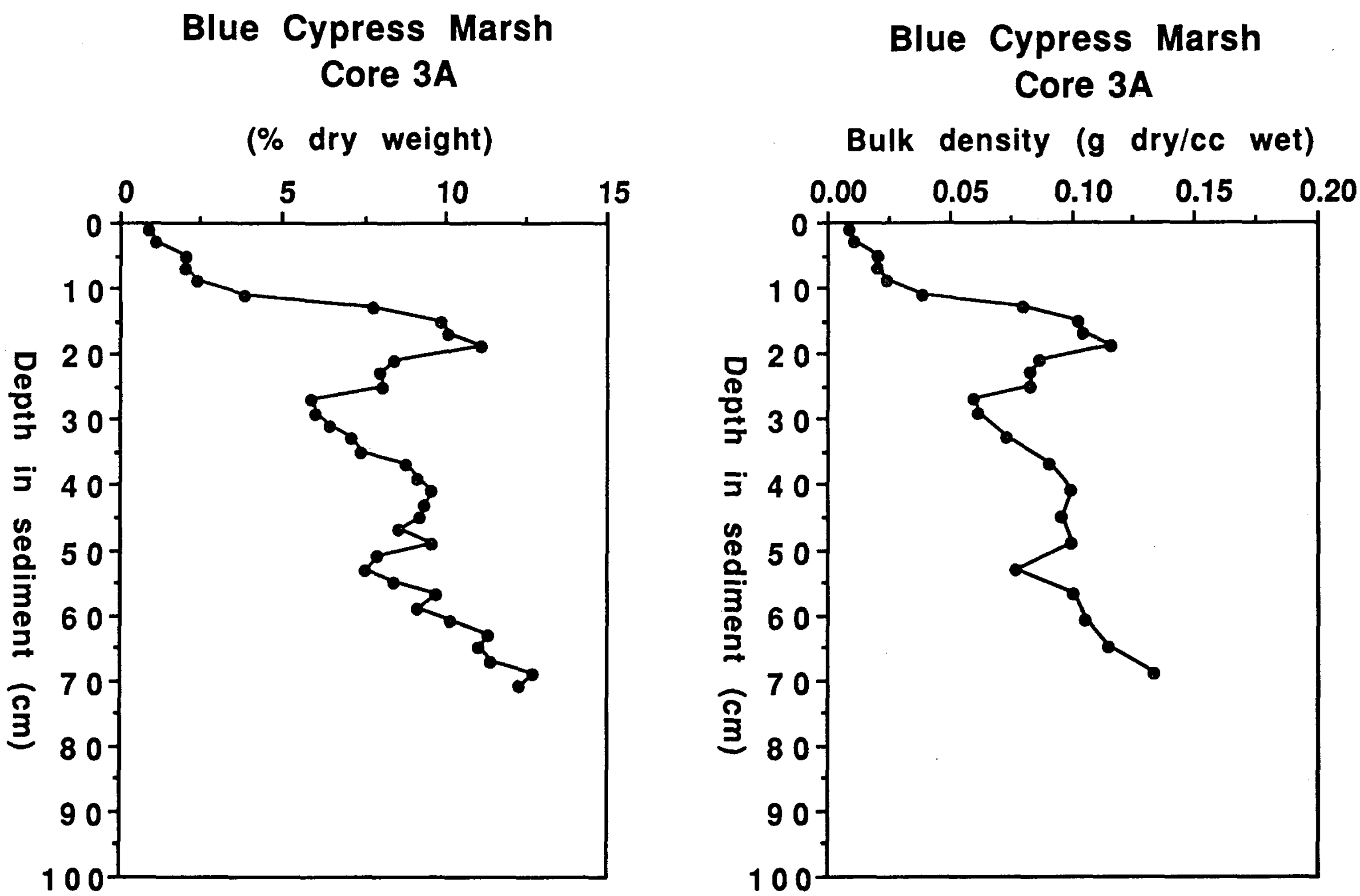
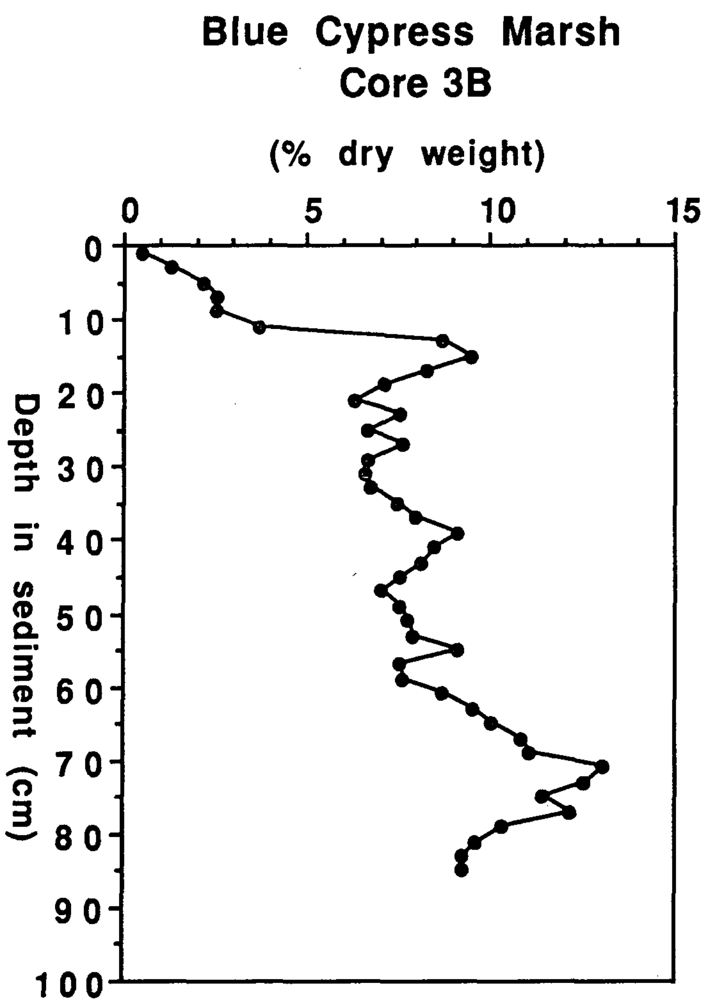


Figure 5. Blue Cypress Marsh Core 3A dry weight (%) and bulk density (g dry cm^{-3} wet).



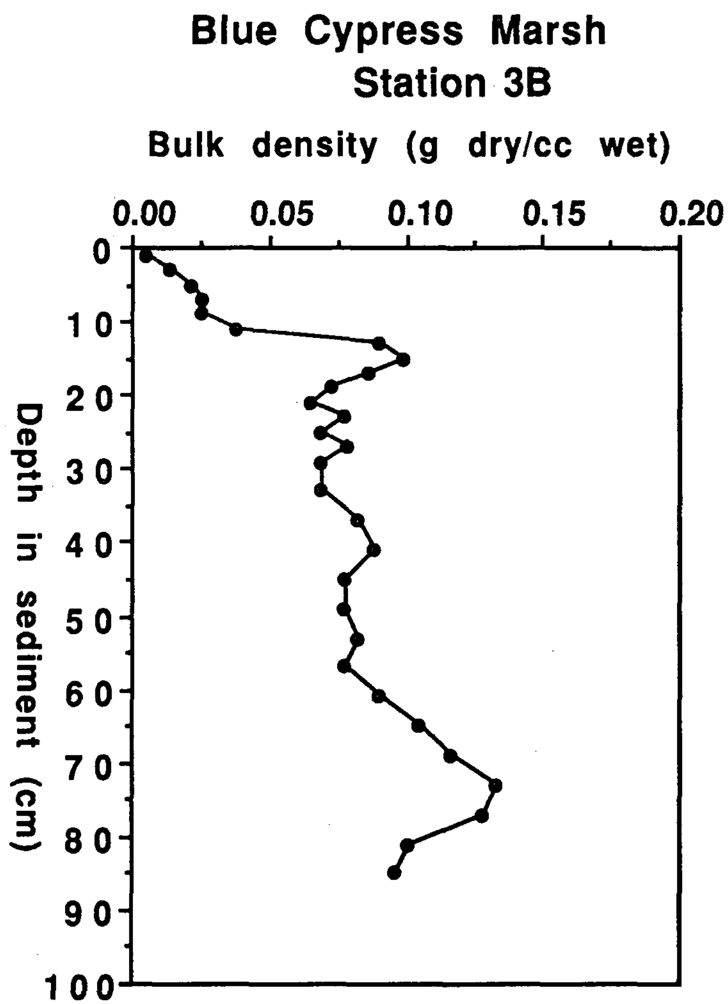


Figure 6. Blue Cypress Marsh Core 3B dry weight (%) and bulk density (g dry cm^{-3} wet).

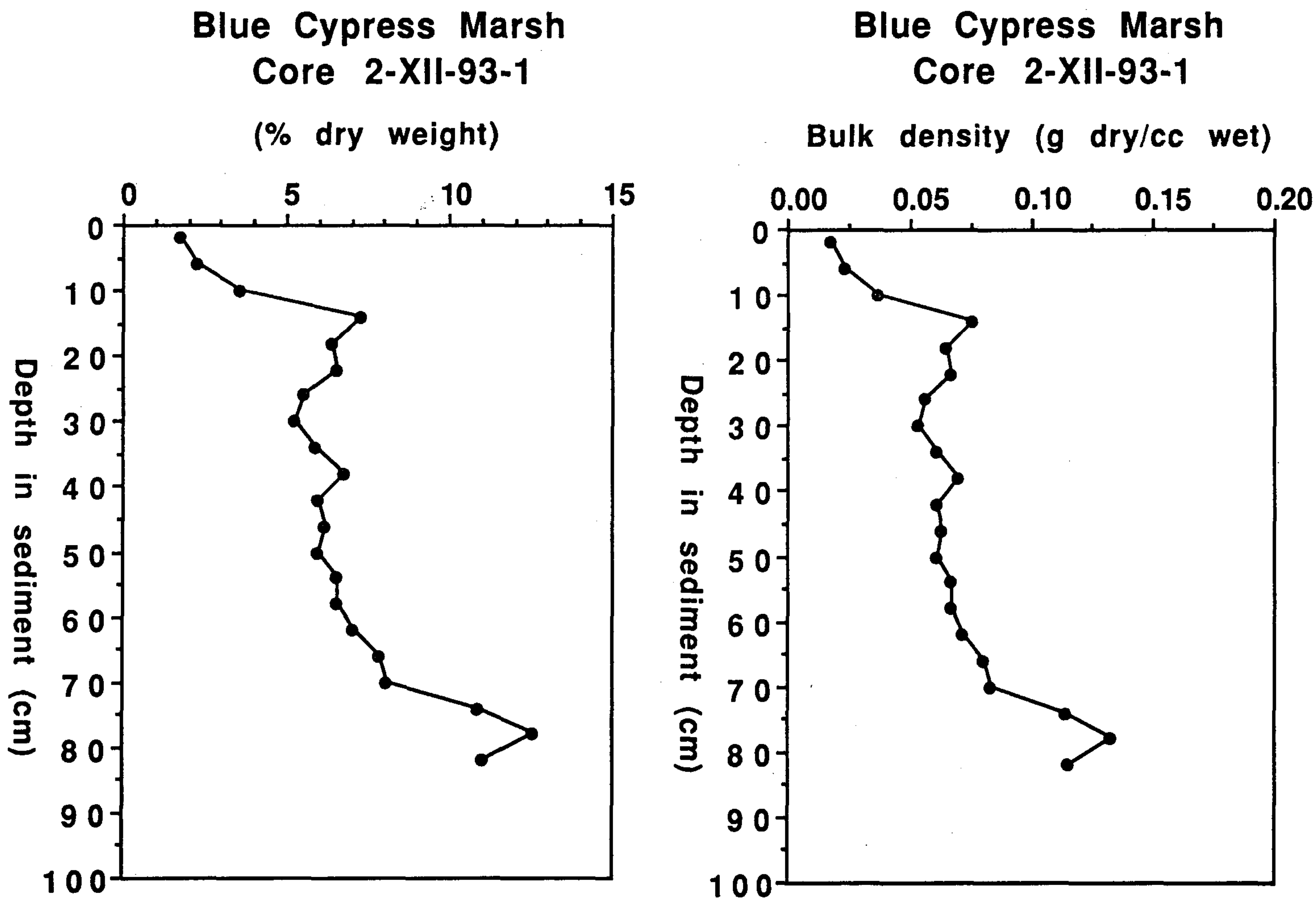


Figure 7. Blue Cypress Marsh Core 2-XII-93-1 dry weight (%) and bulk density (g dry cm^{-3} wet).

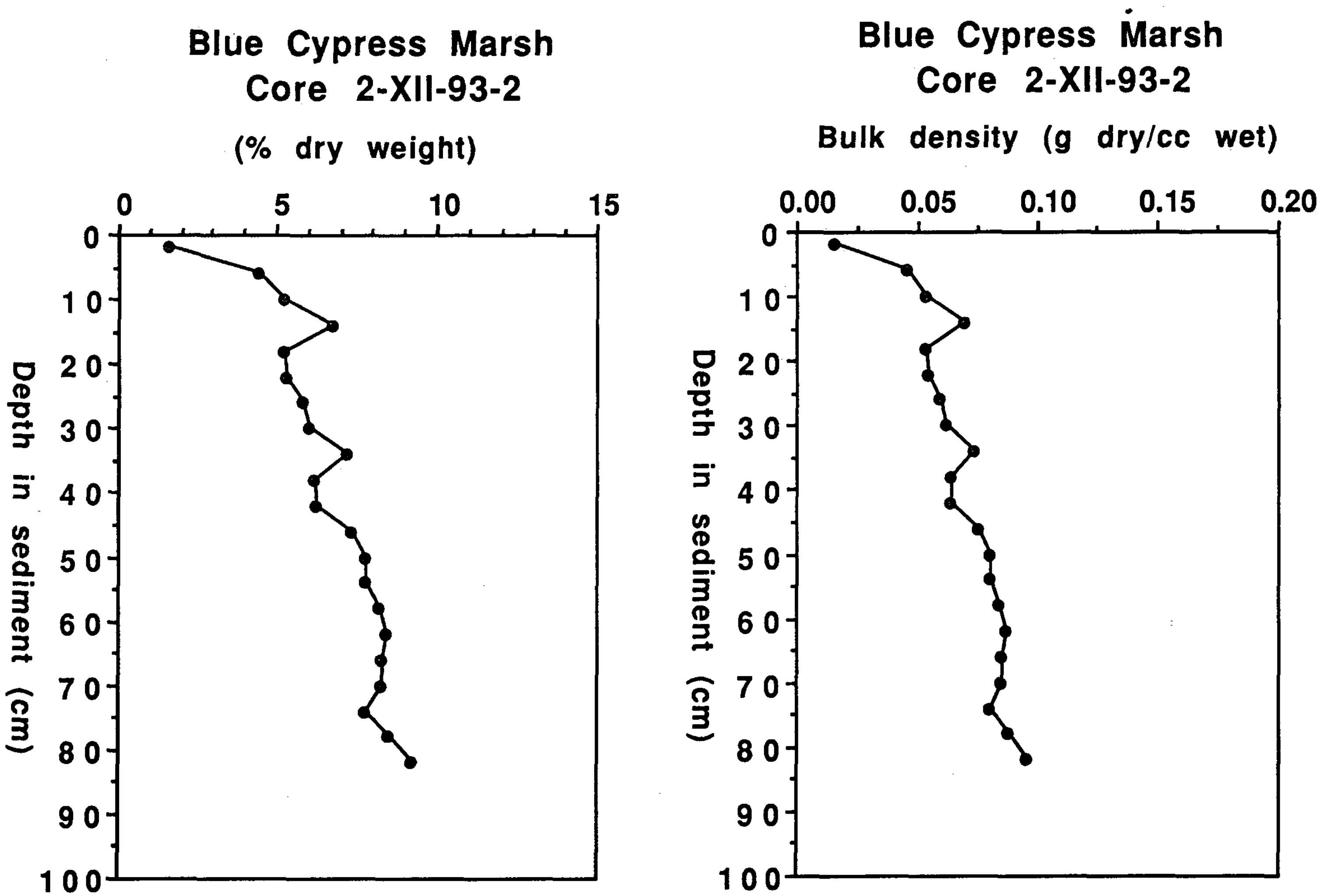


Figure 8. Blue Cypress Marsh Core 2-XII-93-2 dry weight (%) and bulk density (g dry cm^{-3} wet).

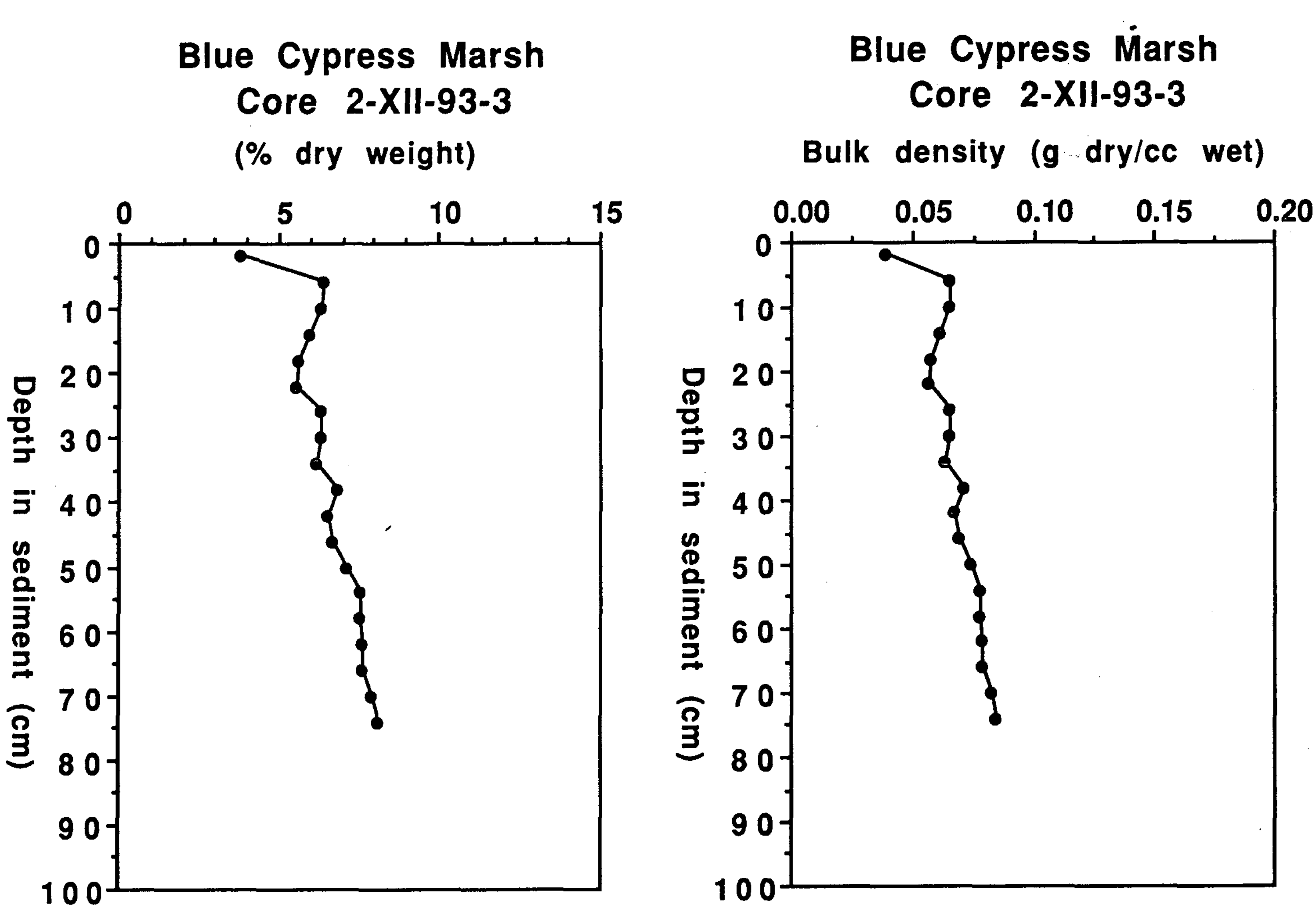


Figure 9. Blue Cypress Marsh Core 2-XII-93-3 dry weight (%) and bulk density (g dry cm^{-3} wet).

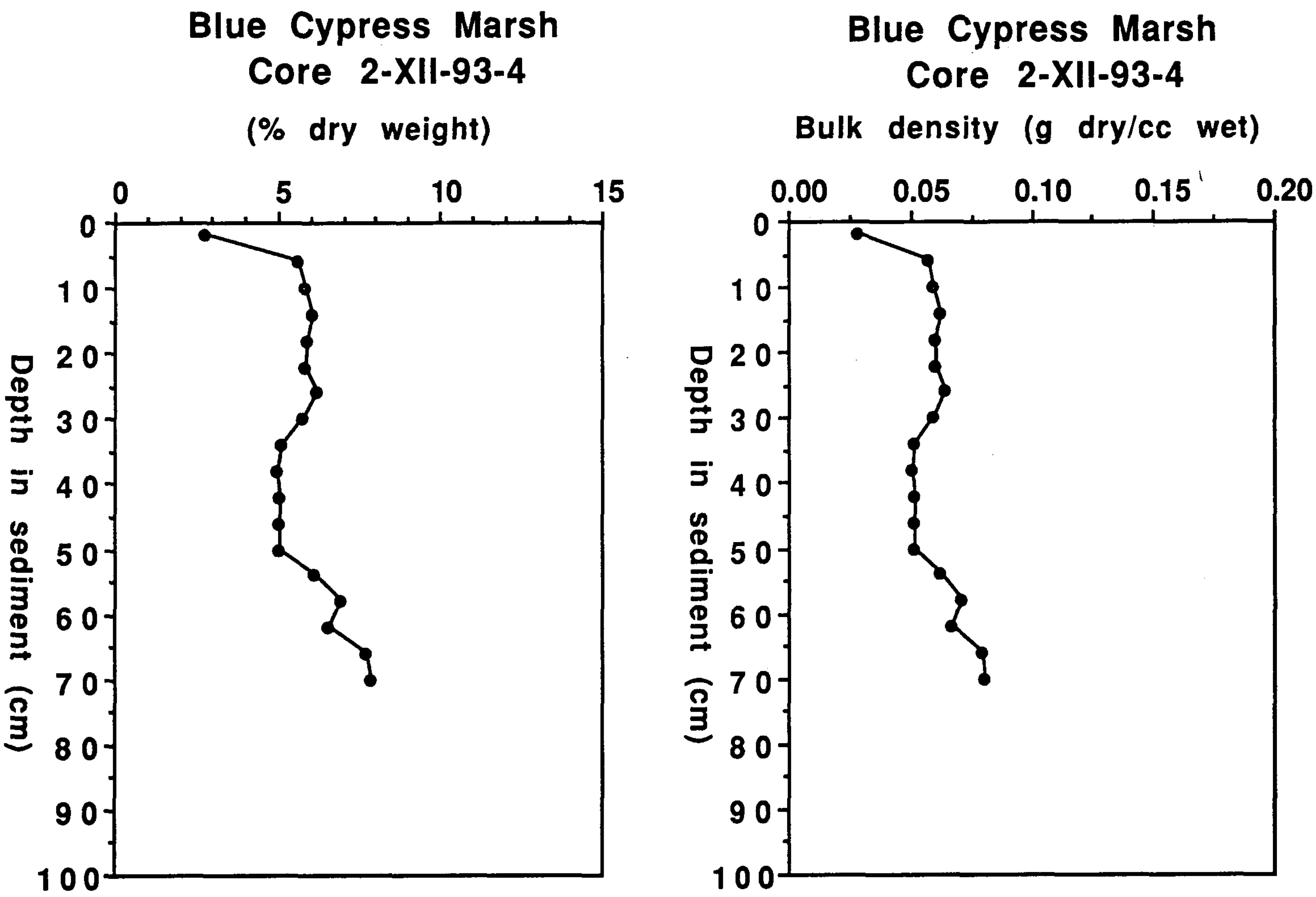


Figure 10. Blue Cypress Marsh Core 2-XII-93-4 dry weight (%) and bulk density (g dry cm^{-3} wet).

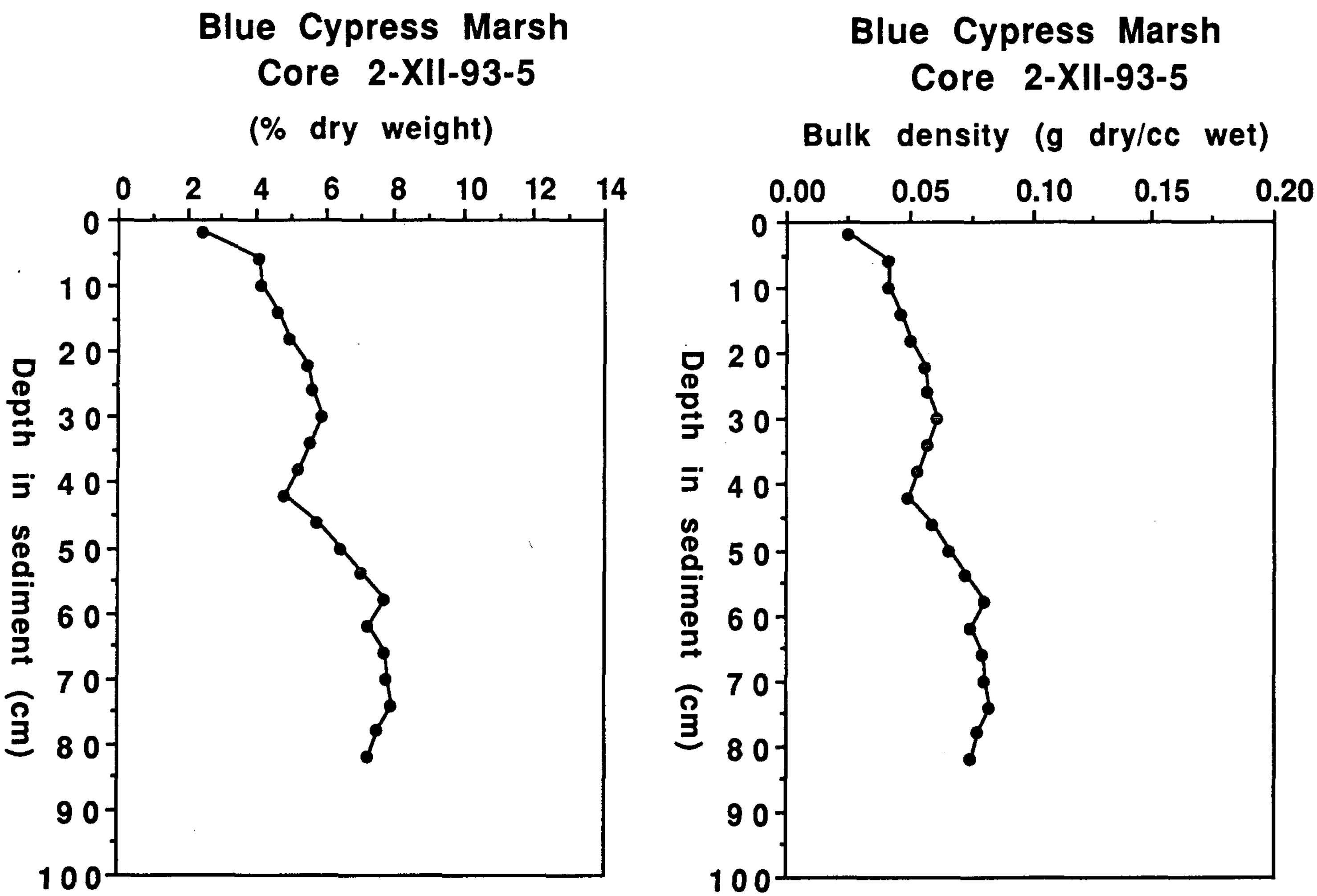


Figure 11. Blue Cypress Marsh Core 2-XII-93-5 dry weight (%) and bulk density (g dry cm^{-3} wet).

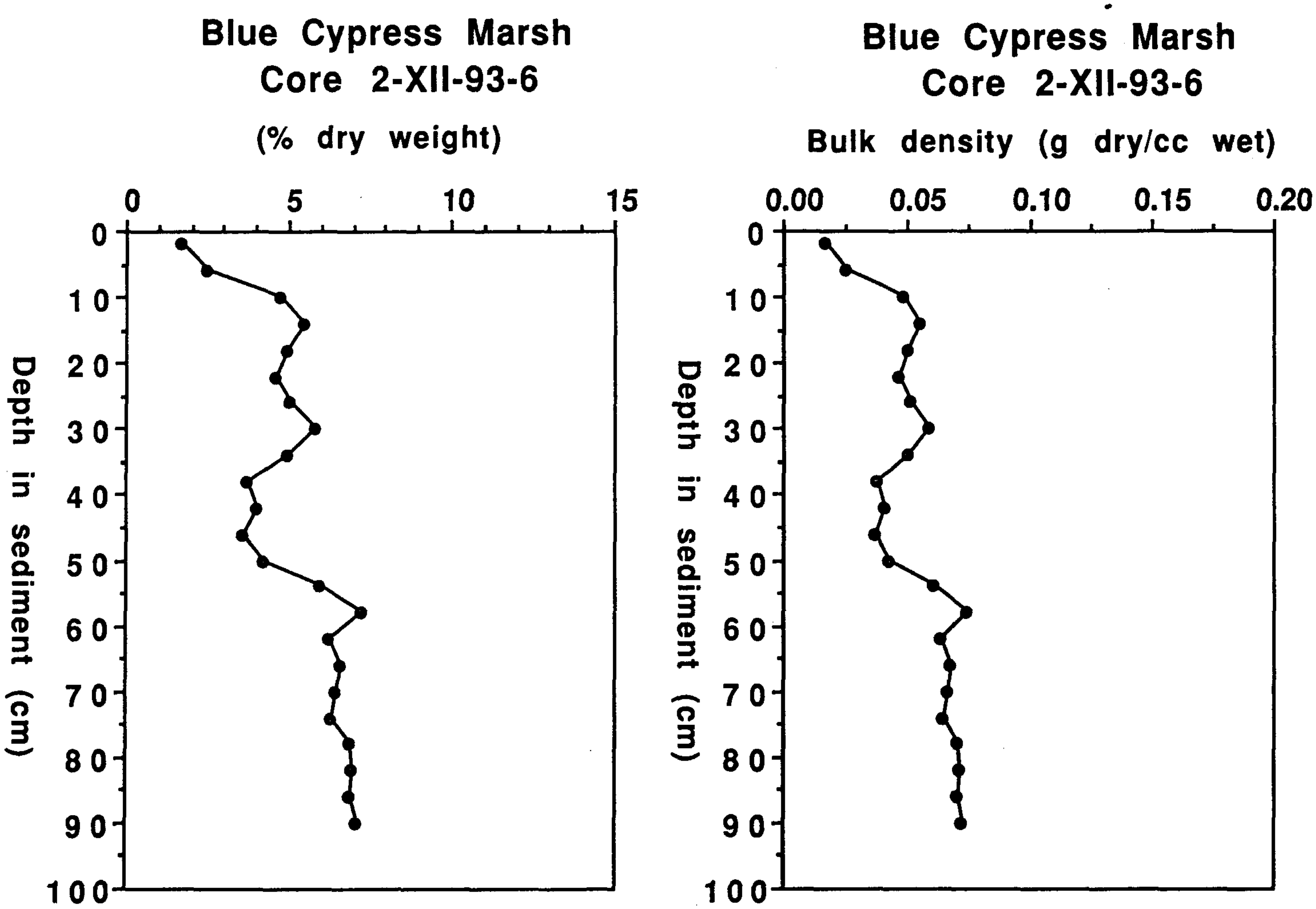


Figure 12. Blue Cypress Marsh Core 2-XII-93-6 dry weight (%) and bulk density (g dry cm^{-3} wet).

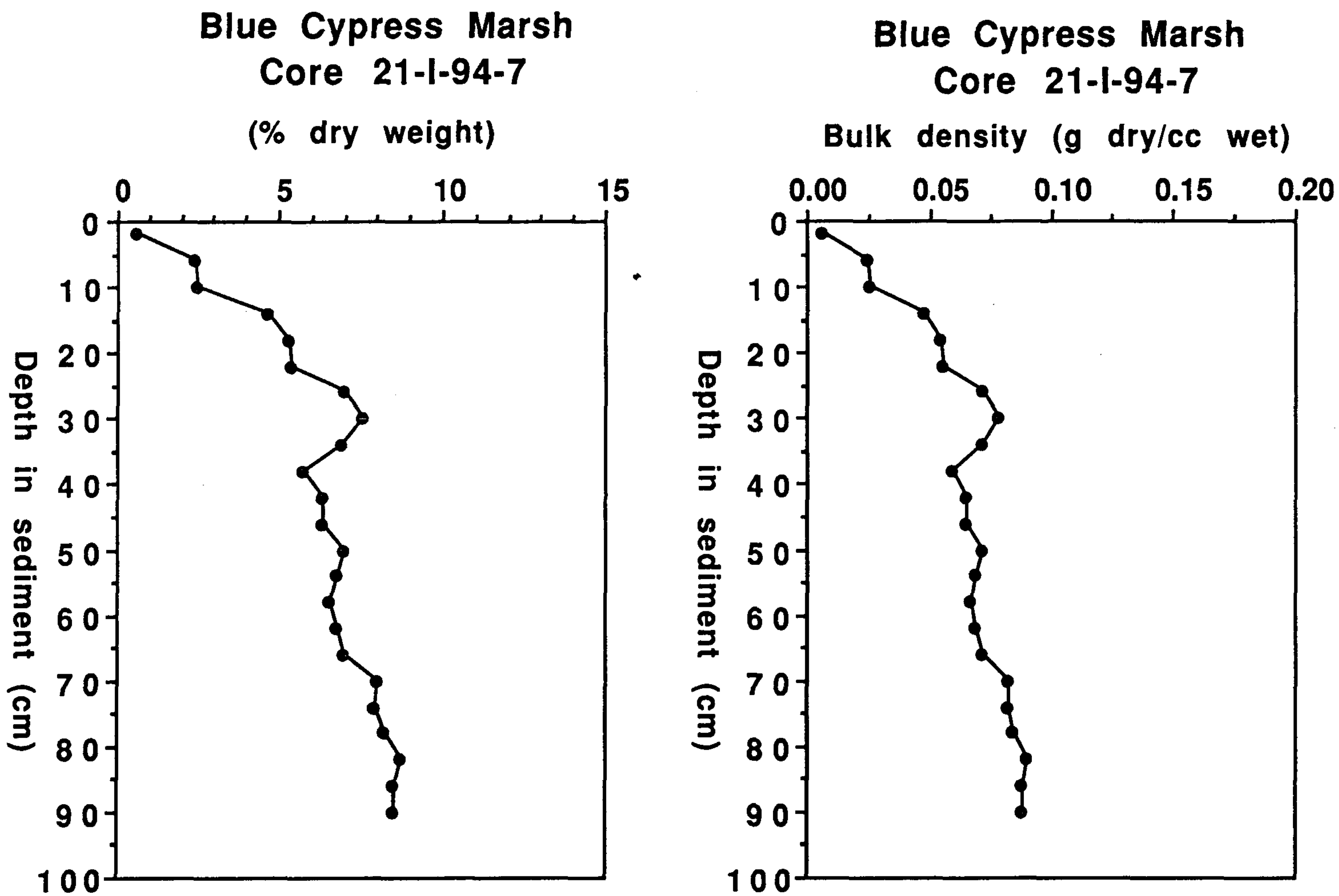


Figure 13. Blue Cypress Marsh Core 2-XII-93-7 dry weight (%) and bulk density (g dry cm^{-3} wet).

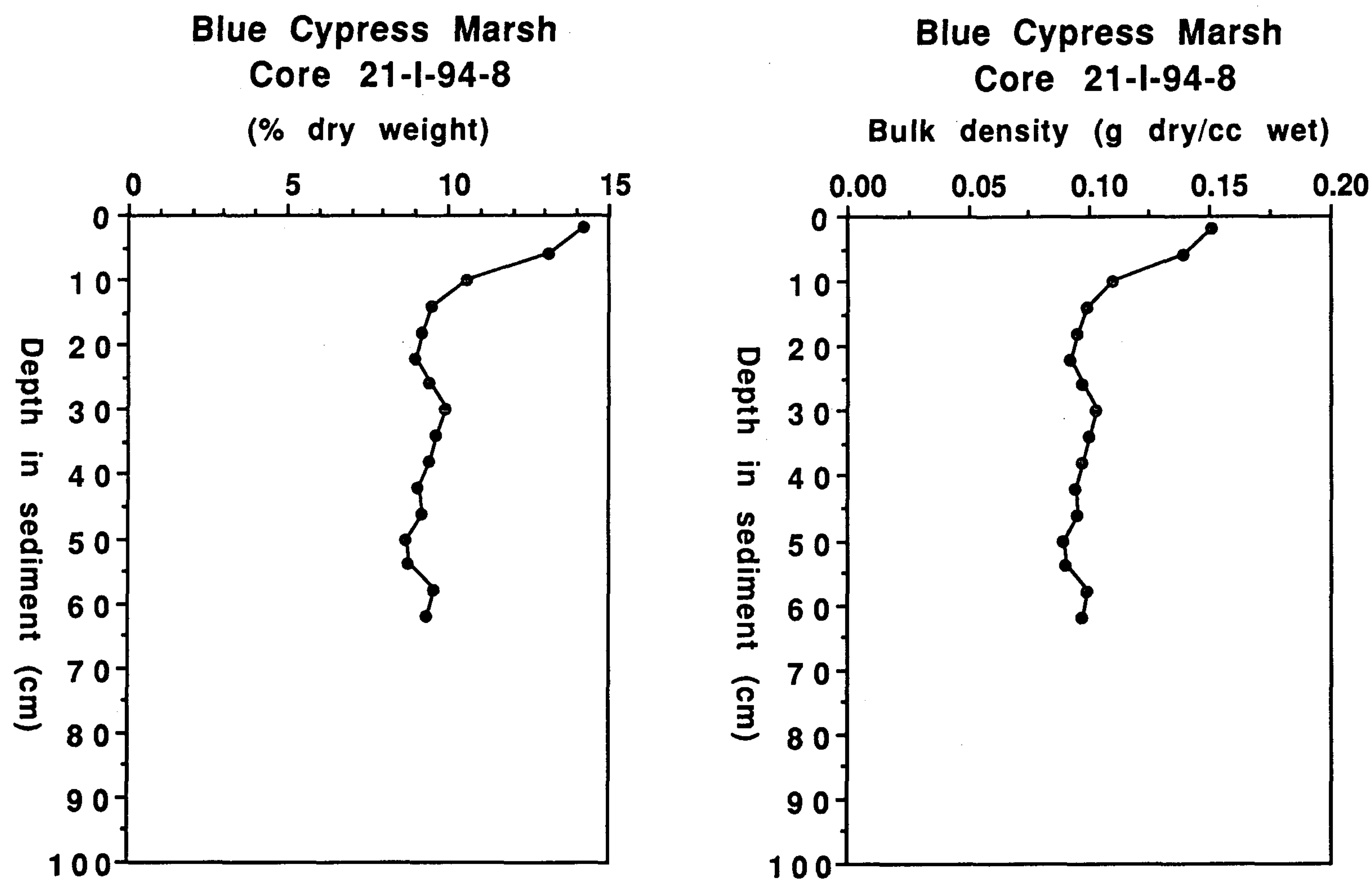


Figure 14. Blue Cypress Marsh Core 21-I-94-8 dry weight (%)
and bulk density (g dry cm^{-3} wet).

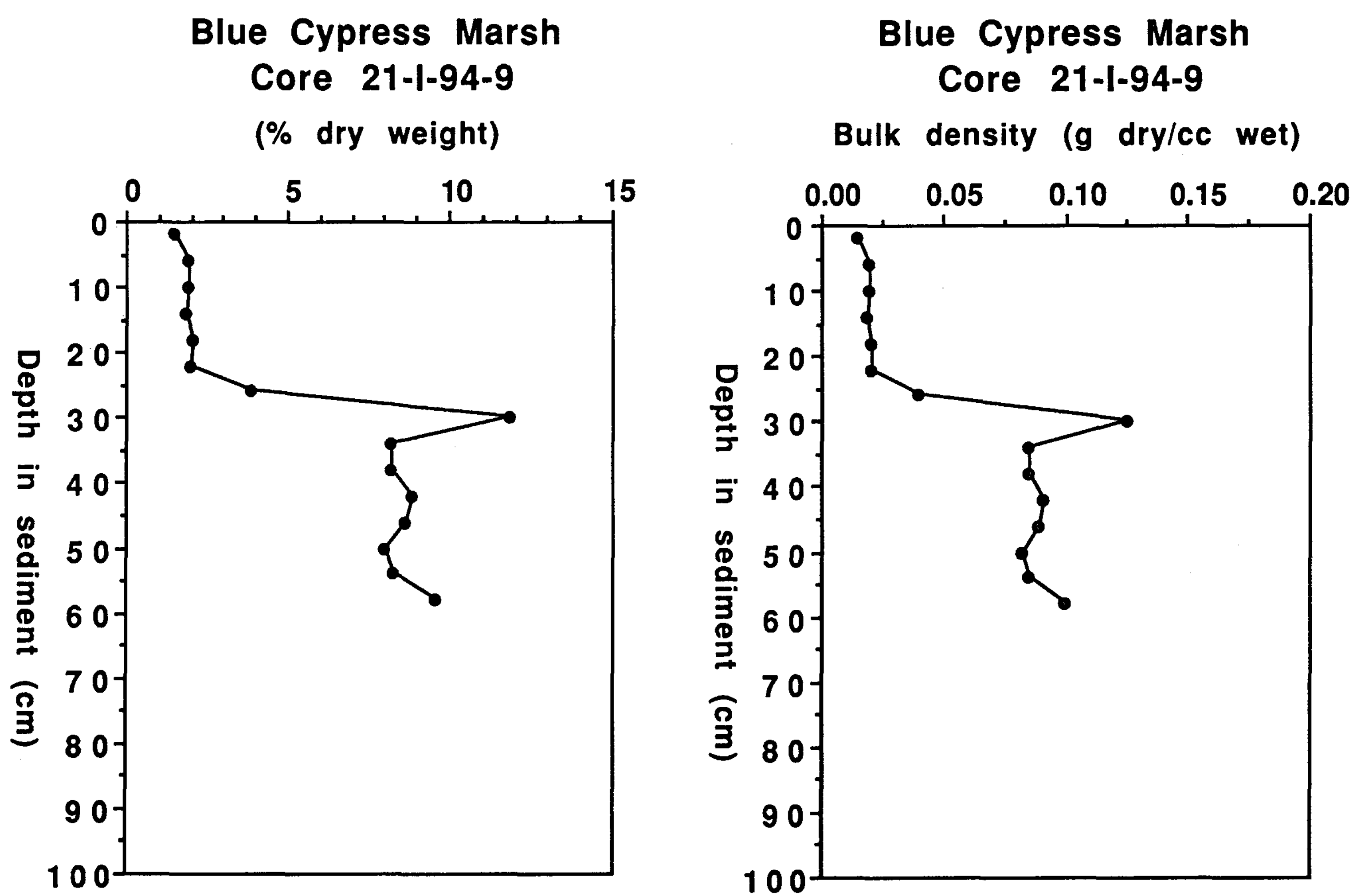
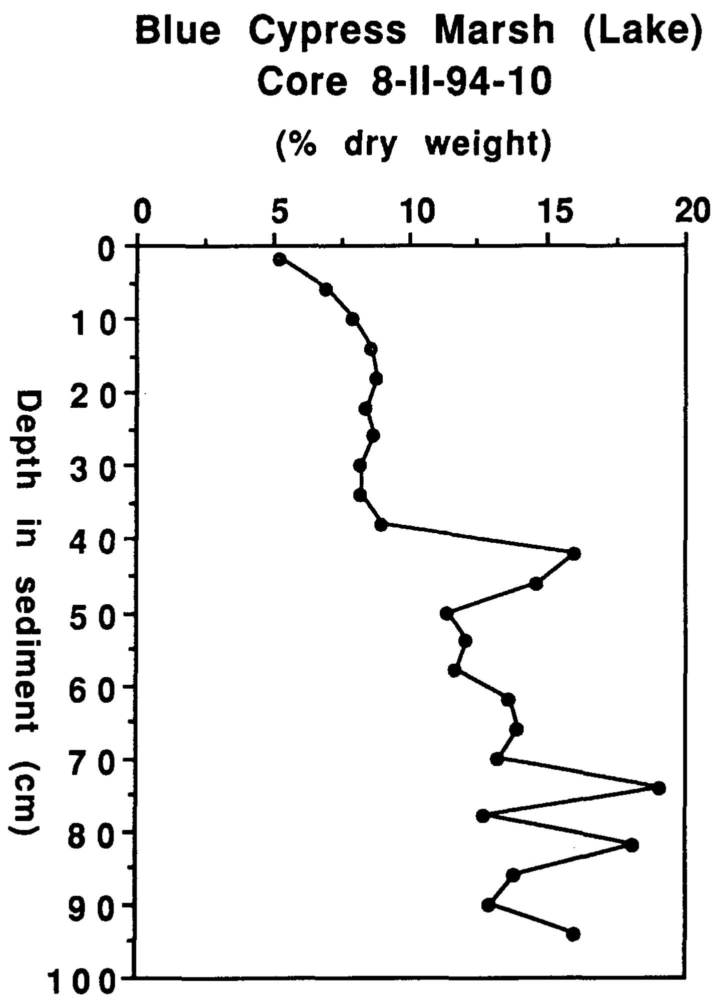


Figure 15. Blue Cypress Marsh Core 21-I-94-9 dry weight (%) and bulk density (g dry cm^{-3} wet).



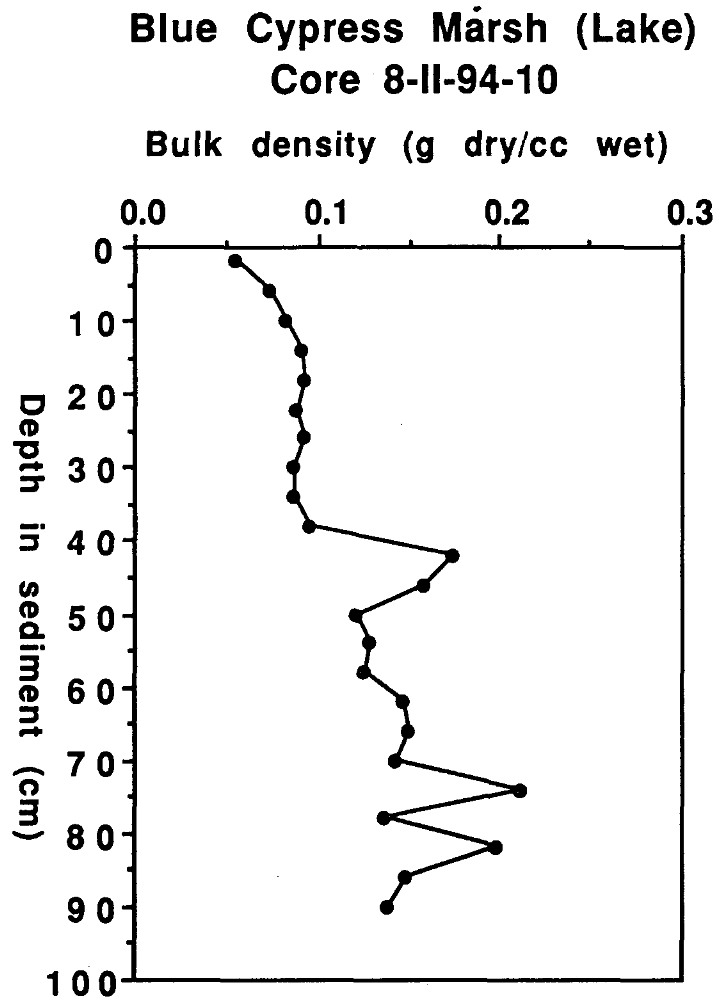


Figure 16. Blue Cypress Marsh Core (Lake) 8-II-94-10 dry weight (%)
and bulk density (g dry cm^{-3} wet).

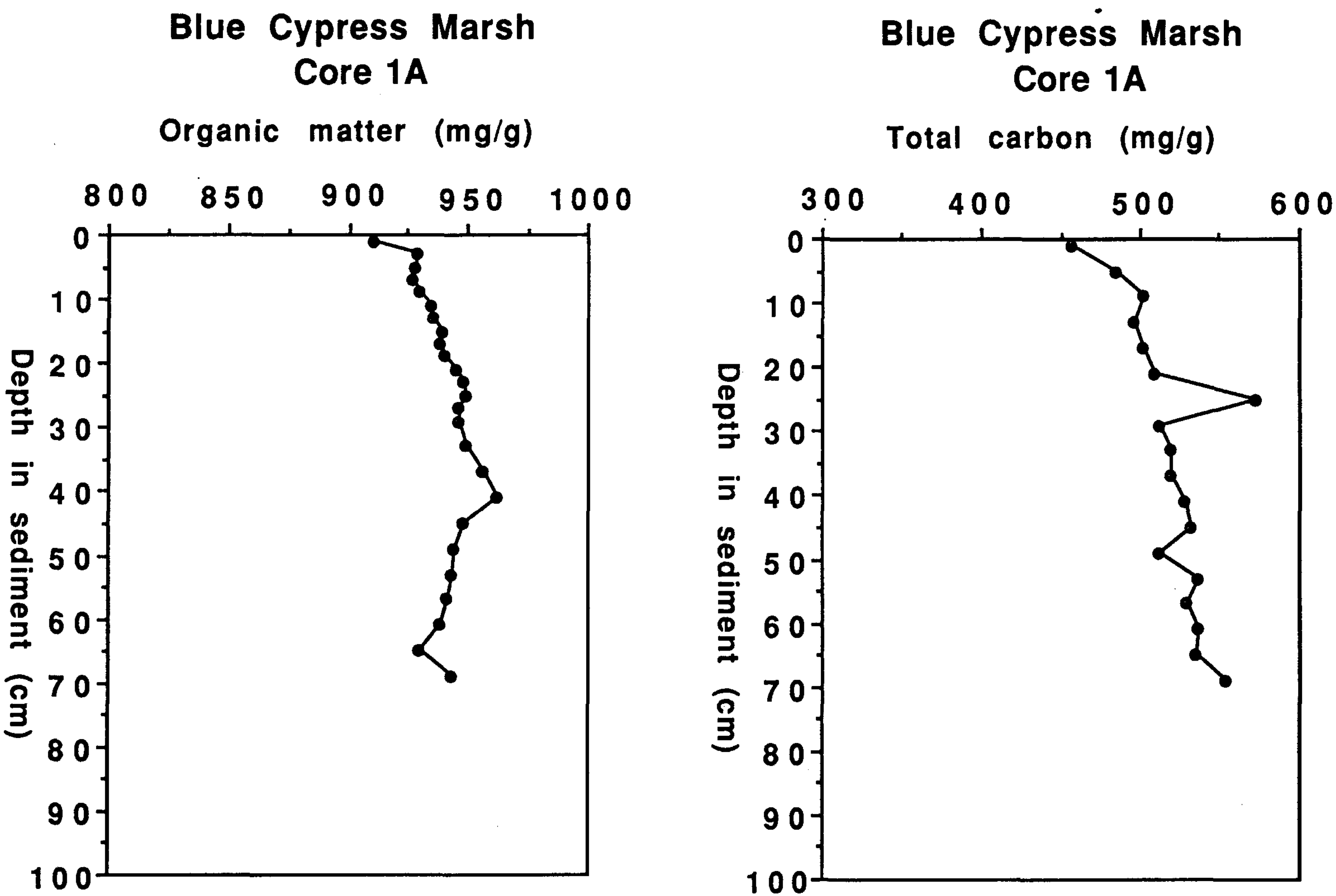
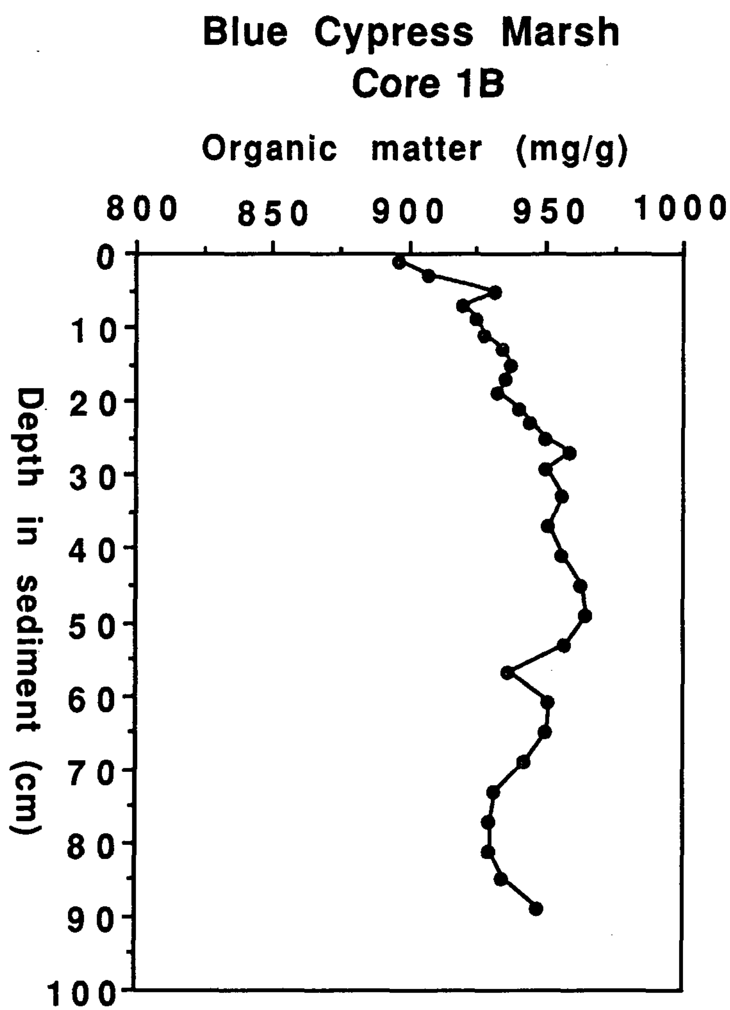


Figure 17. Blue Cypress Marsh Core 1A organic matter (mg g^{-1}) and total carbon (mg g^{-1}).



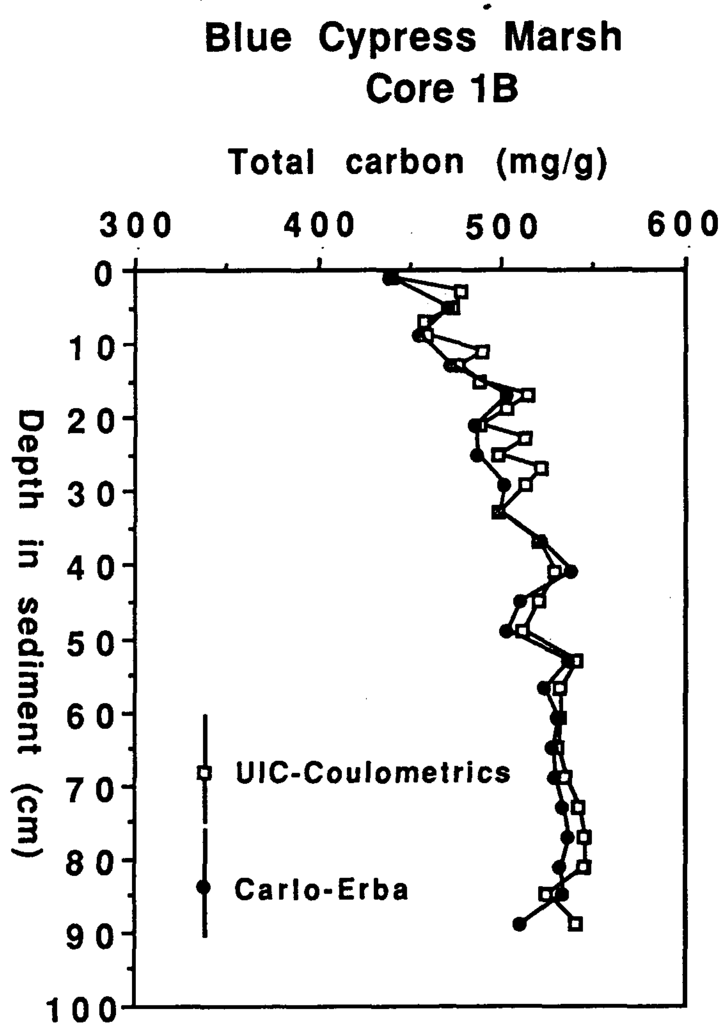


Figure 18. Blue Cypress Marsh Core 1B organic matter (mg g^{-1}) and total carbon (mg g^{-1}).

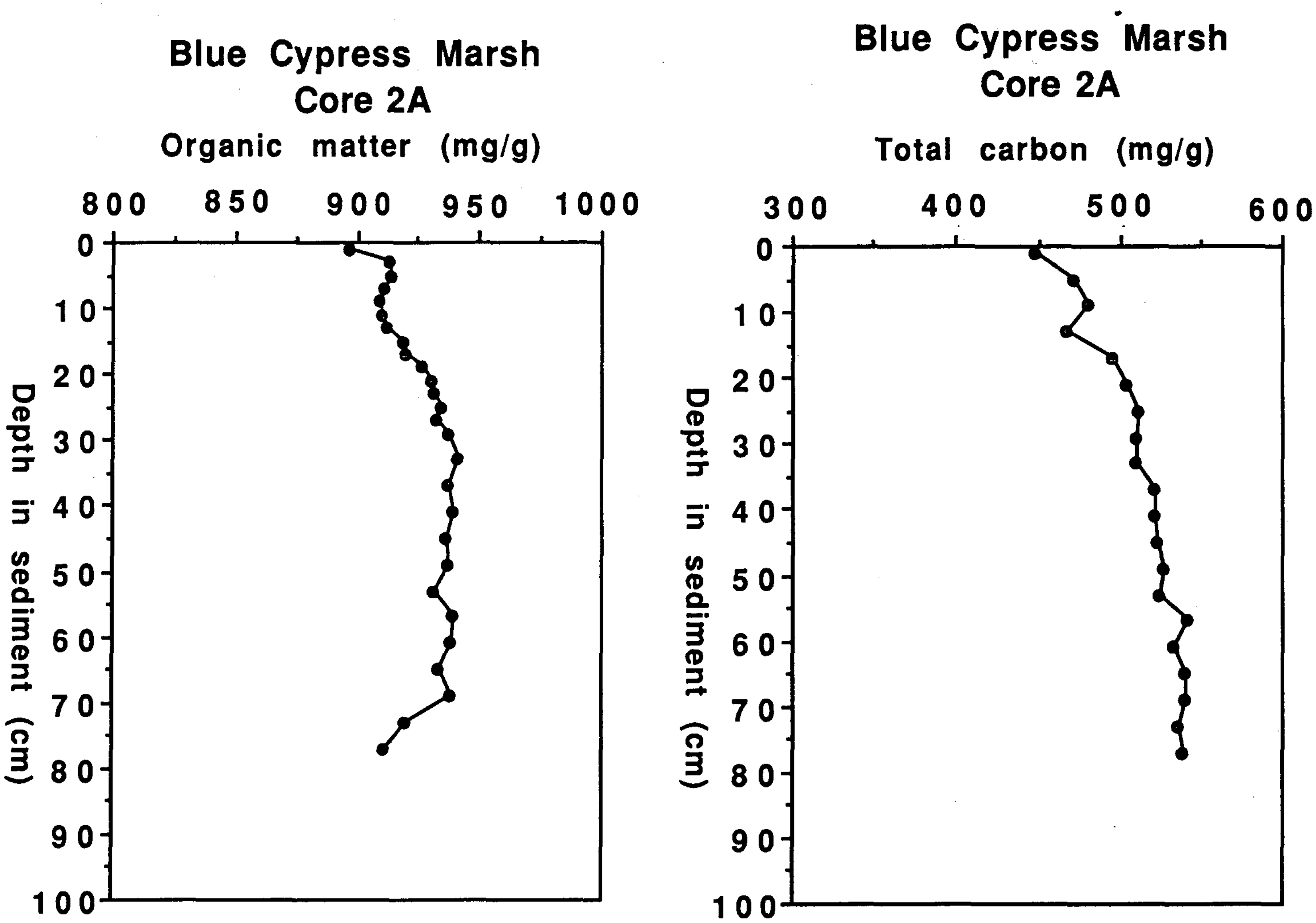


Figure 19. Blue Cypress Marsh Core 2A organic matter (mg g^{-1}) and total carbon (mg g^{-1}).

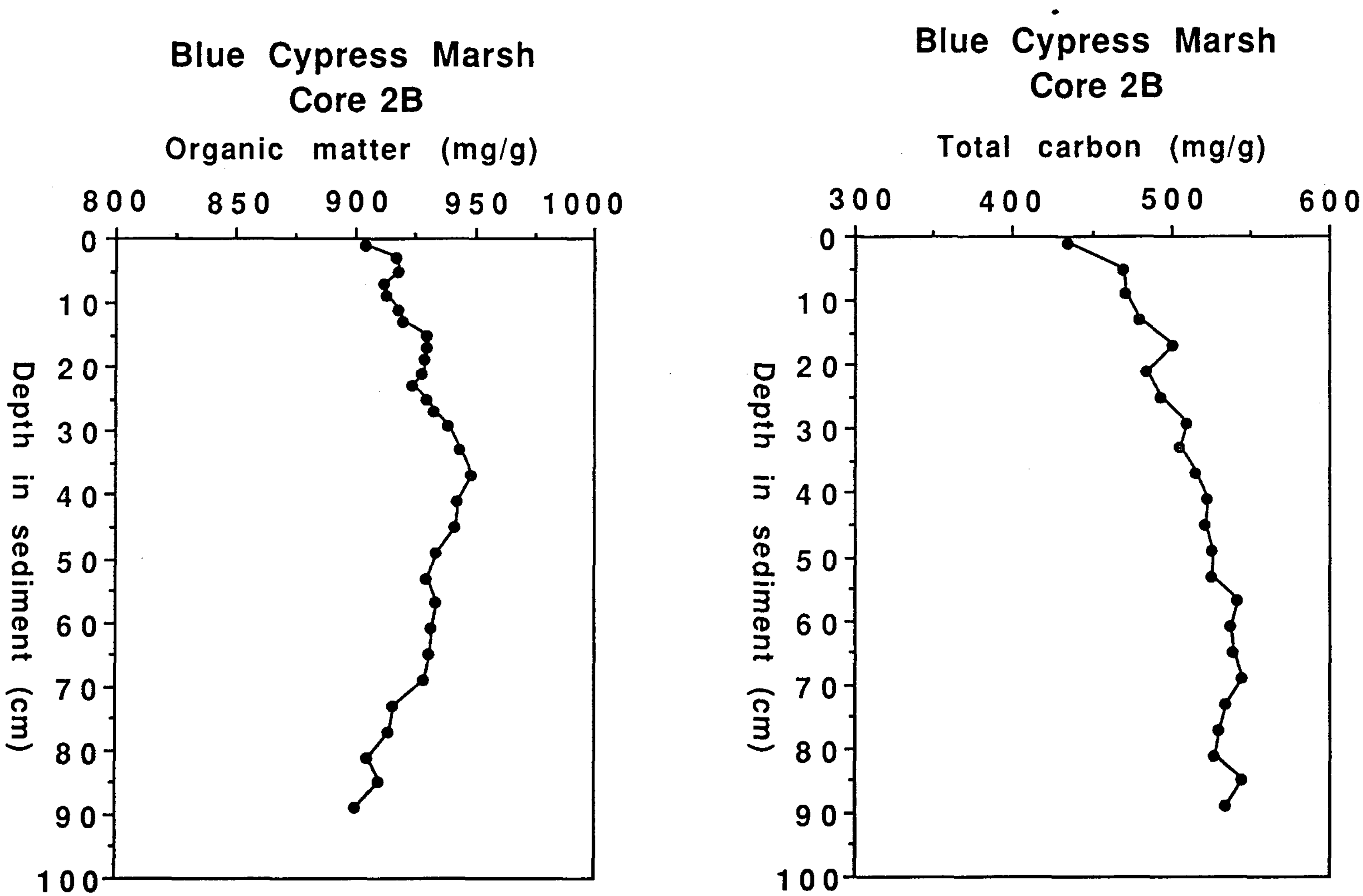
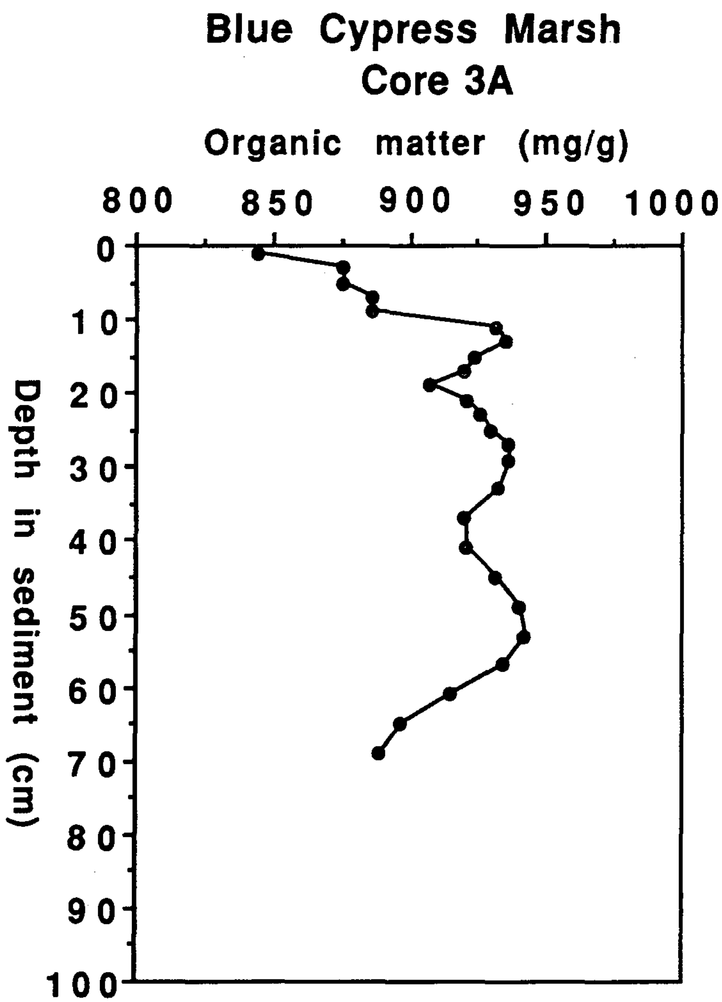


Figure 20. Blue Cypress Marsh Core 2B organic matter (mg g^{-1}) and total carbon (mg g^{-1}).

94



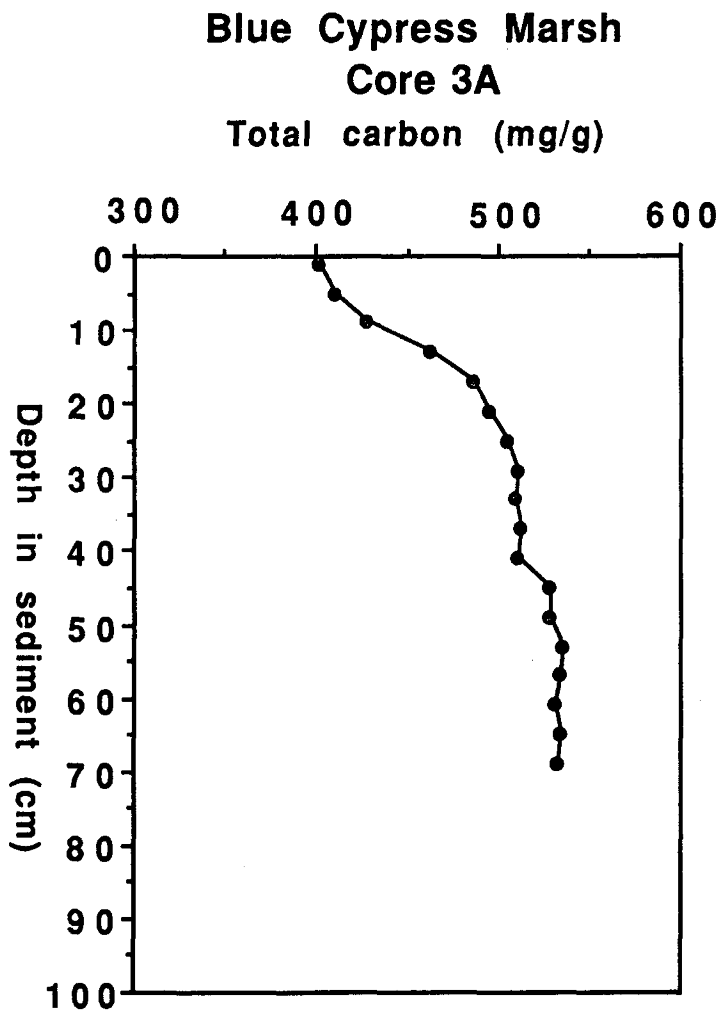
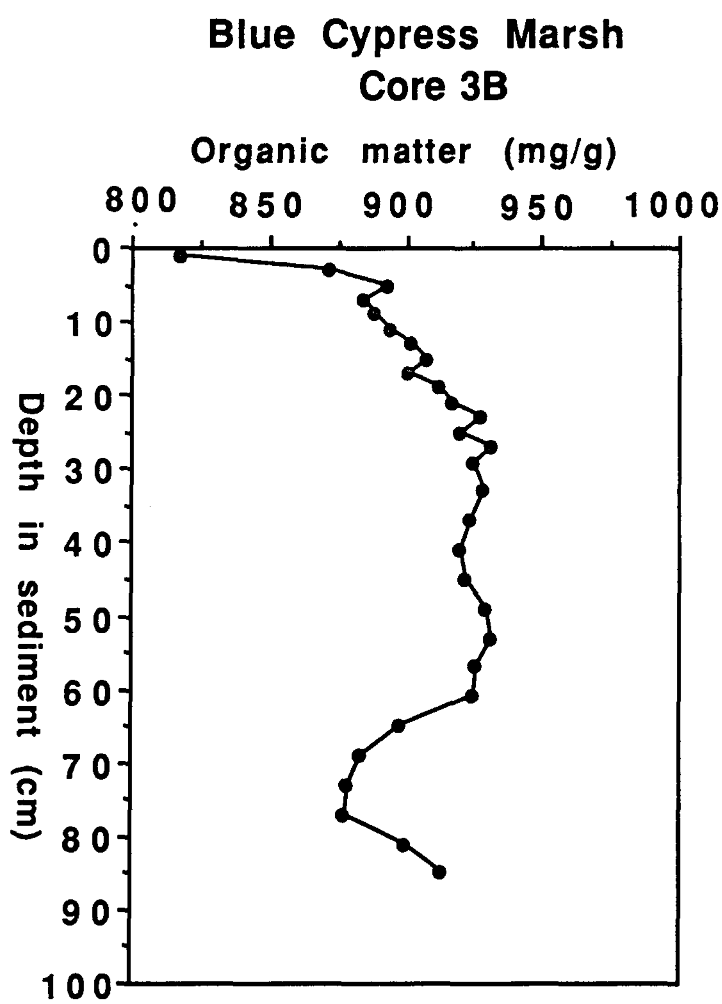


Figure 21. Blue Cypress Marsh Core 3A organic matter (mg g^{-1}) and total carbon (mg g^{-1}).



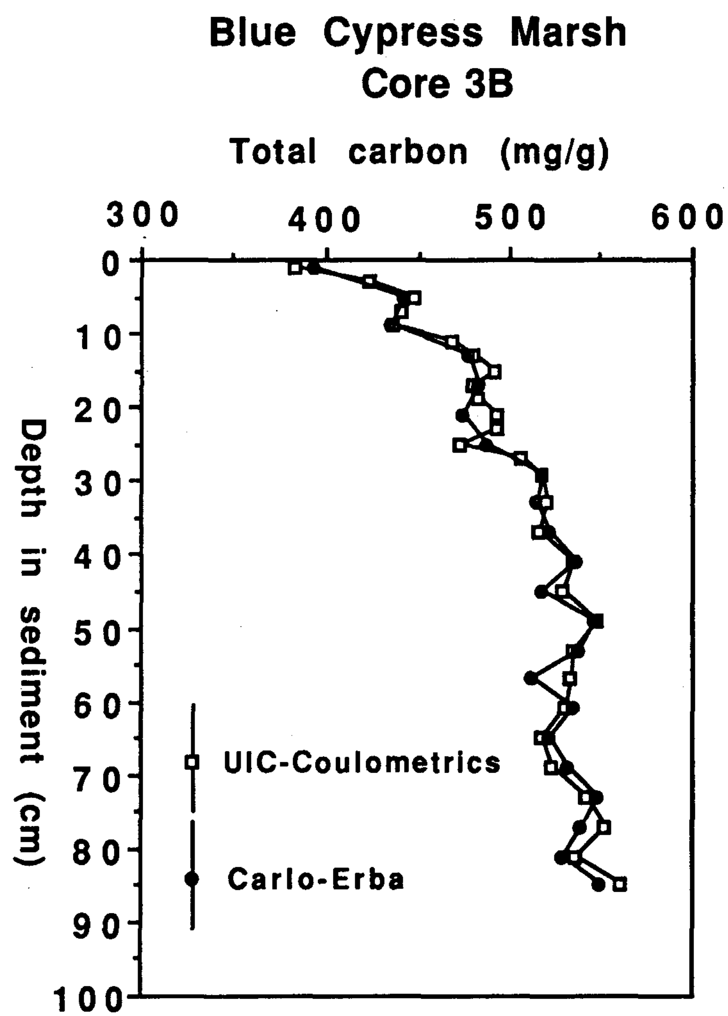


Figure 22. Blue Cypress Marsh Core 3B organic matter (mg g^{-1}) and total carbon (mg g^{-1}).

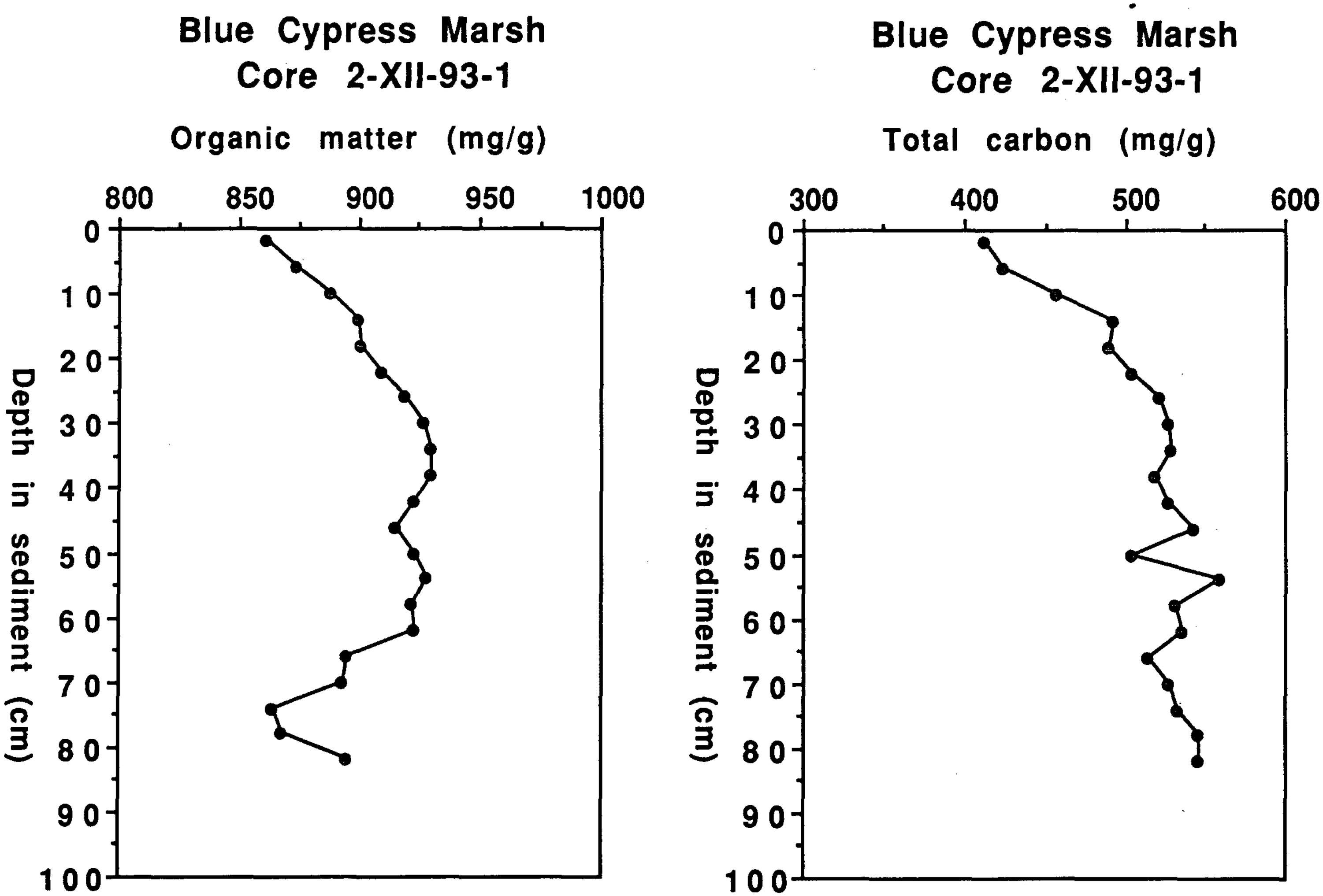


Figure 23. Blue Cypress Marsh Core 2-XII-93-1 organic matter (mg g^{-1}) and total carbon (mg g^{-1}).

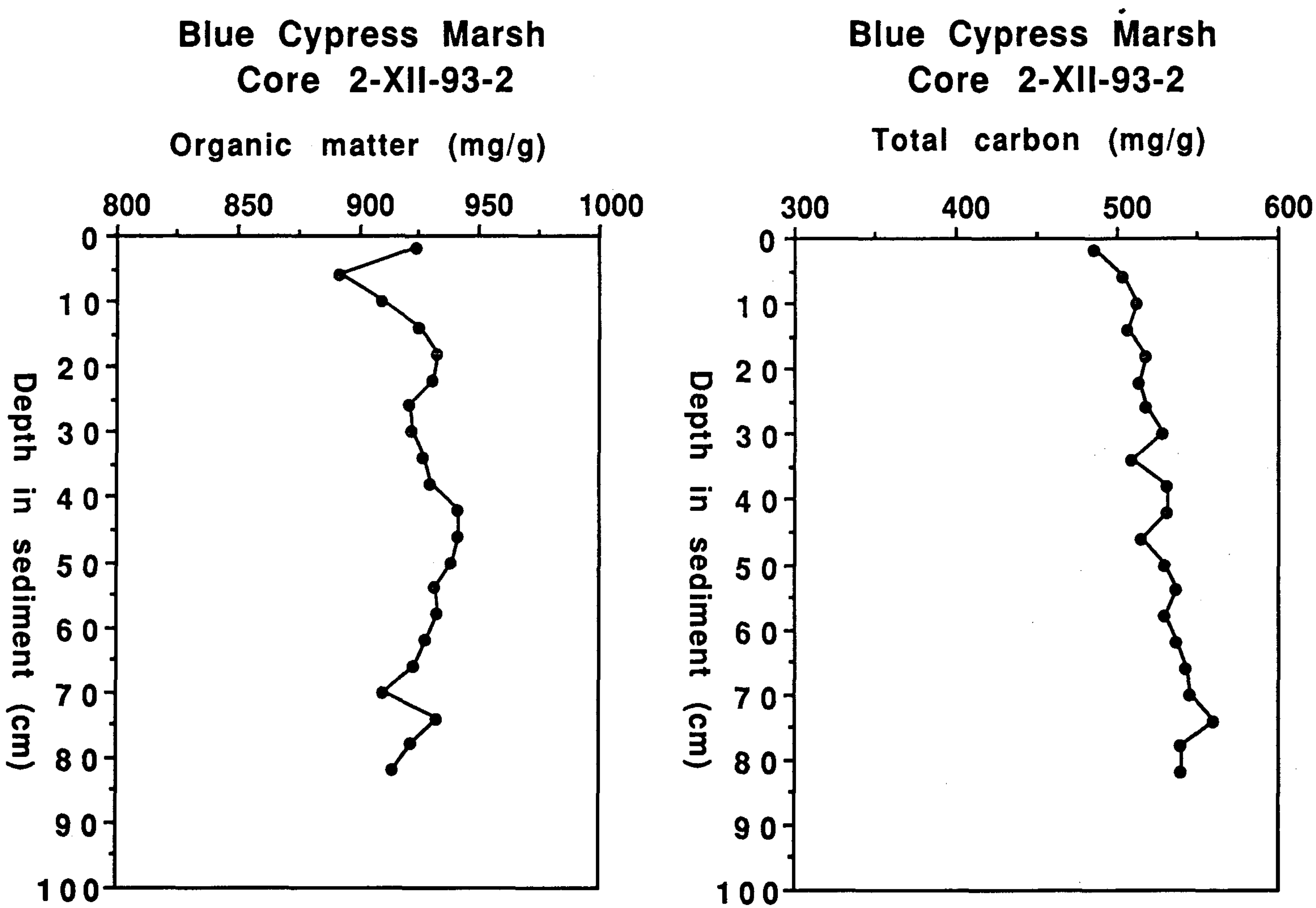


Figure 24. Blue Cypress Marsh Core 2-XII-93-2 organic matter (mg g^{-1}) and total carbon (mg g^{-1}).

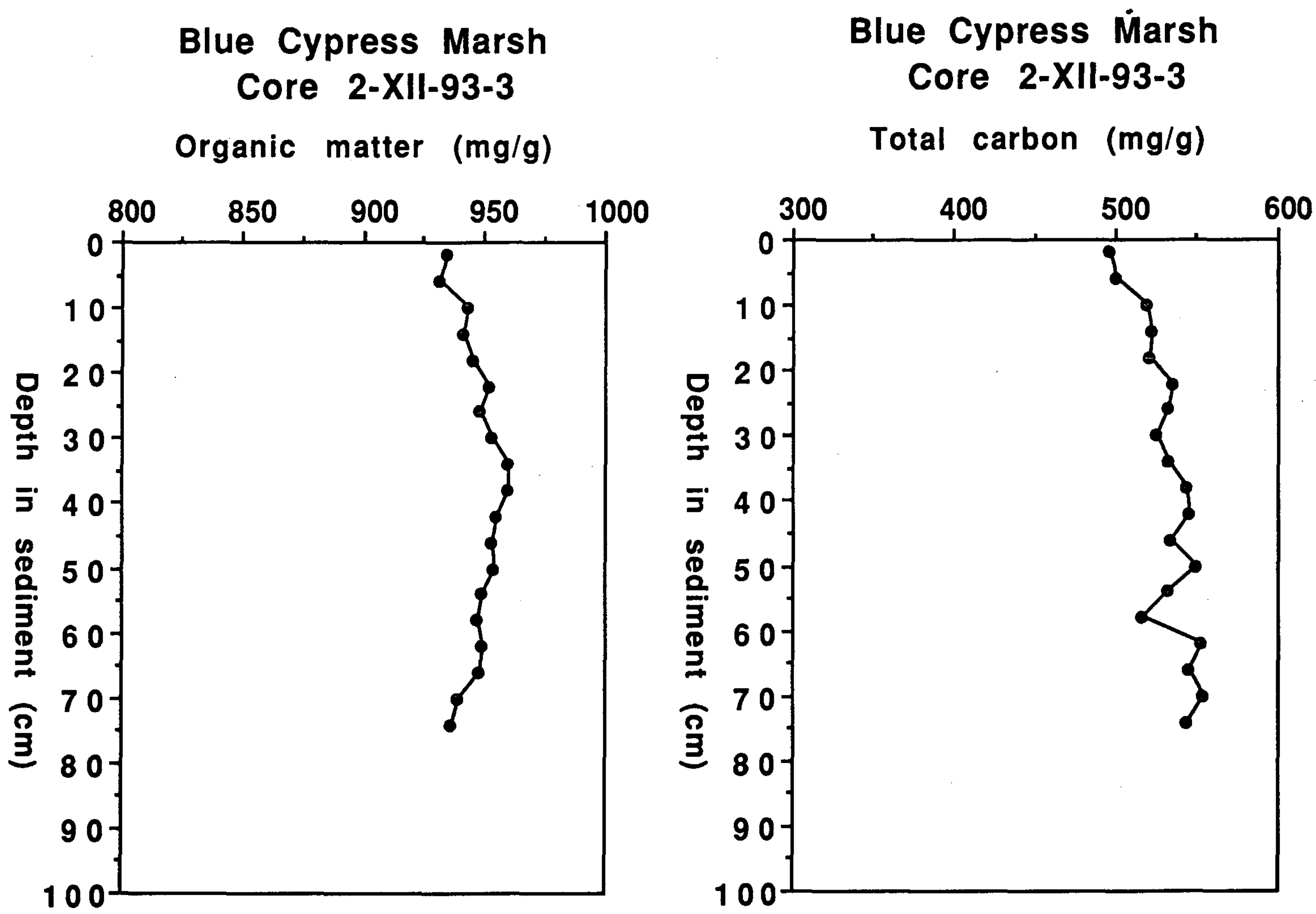


Figure 25. Blue Cypress Marsh Core 2-XII-93-3 organic matter (mg g^{-1}) and total carbon (mg g^{-1}).

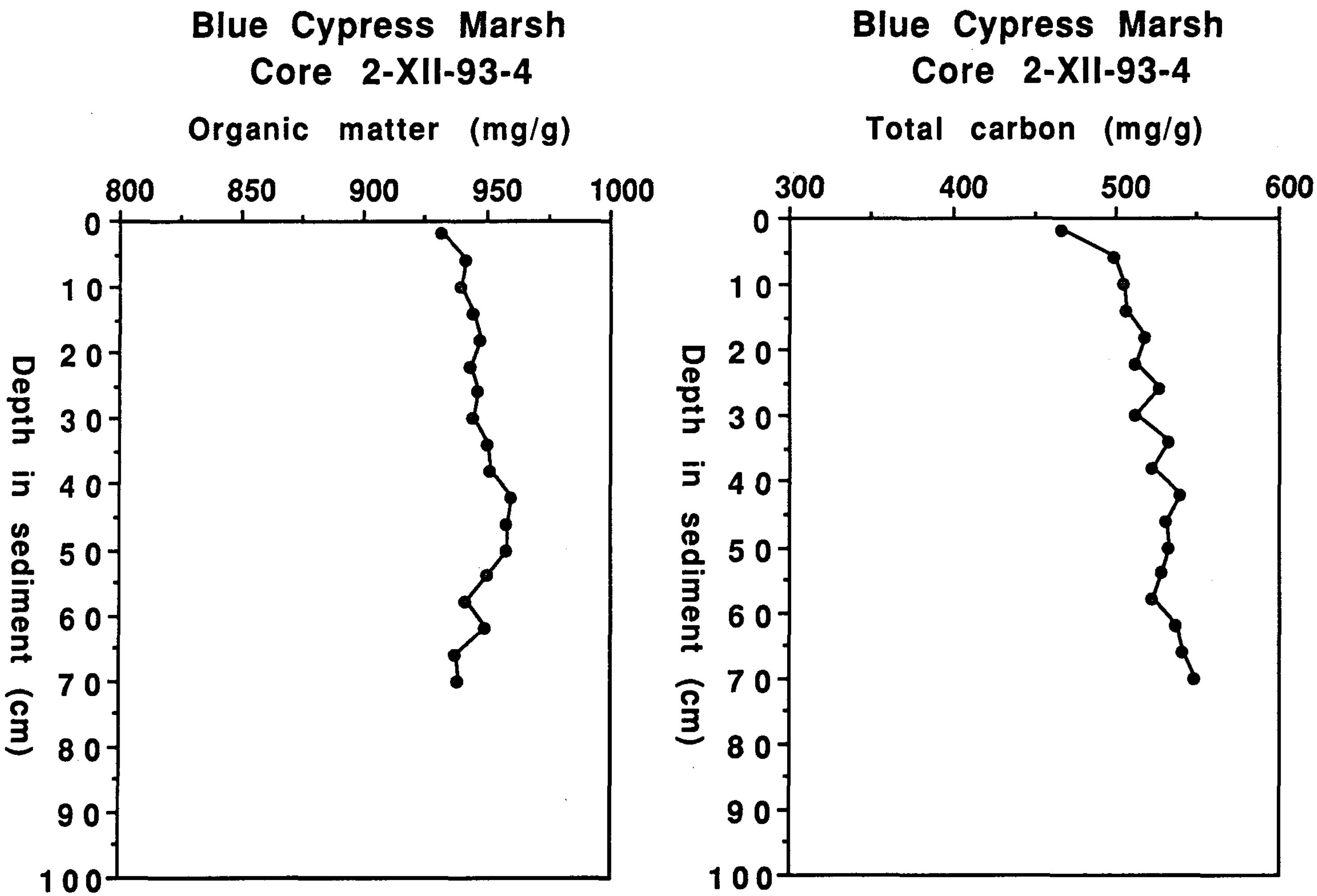


Figure 26. Blue Cypress Marsh Core 2-XII-93-4 organic matter (mg g^{-1}) and total carbon (mg g^{-1}).

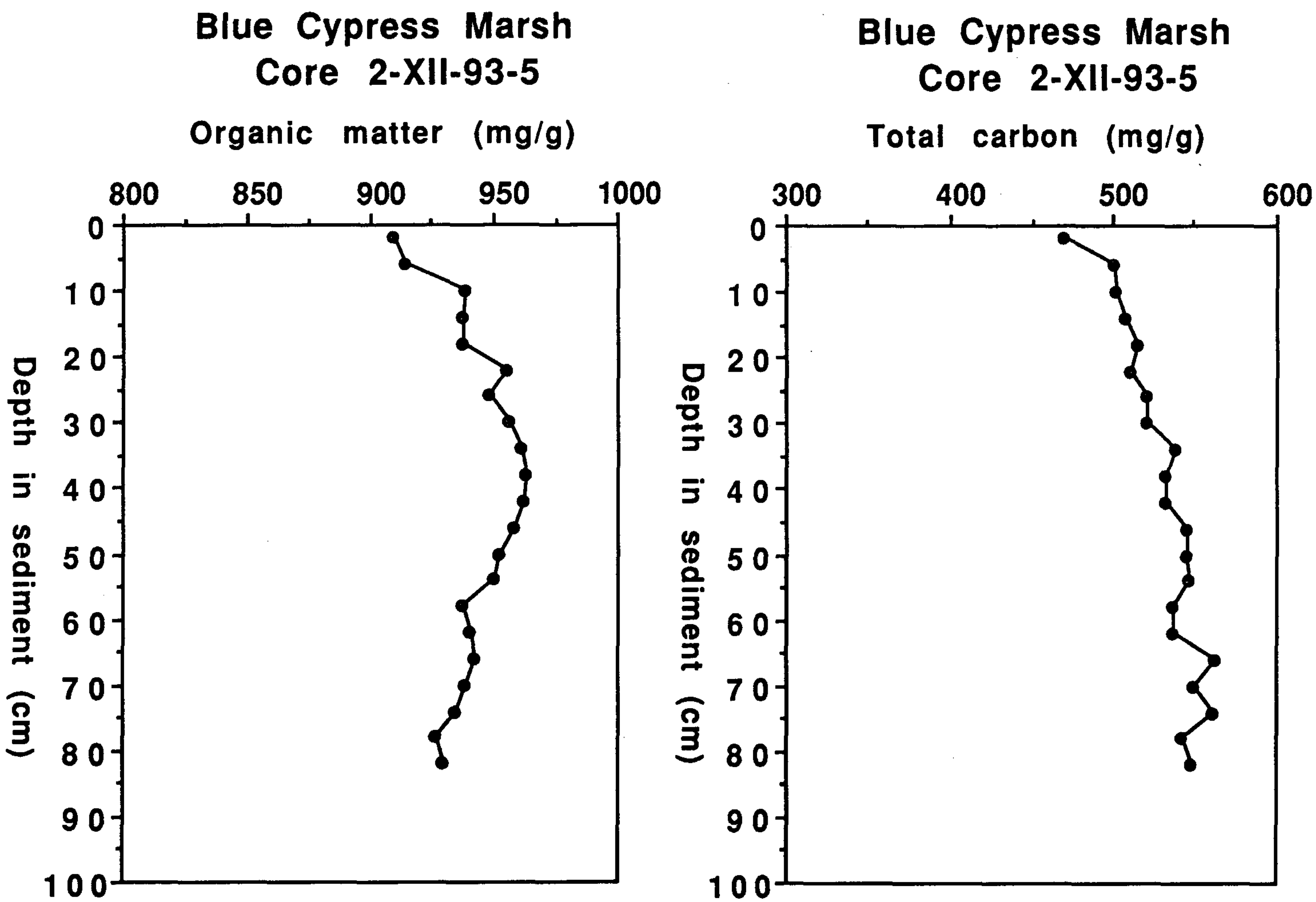


Figure 27. Blue Cypress Marsh Core 2-XII-93-5 organic matter (mg g^{-1})
and total carbon (mg g^{-1}).

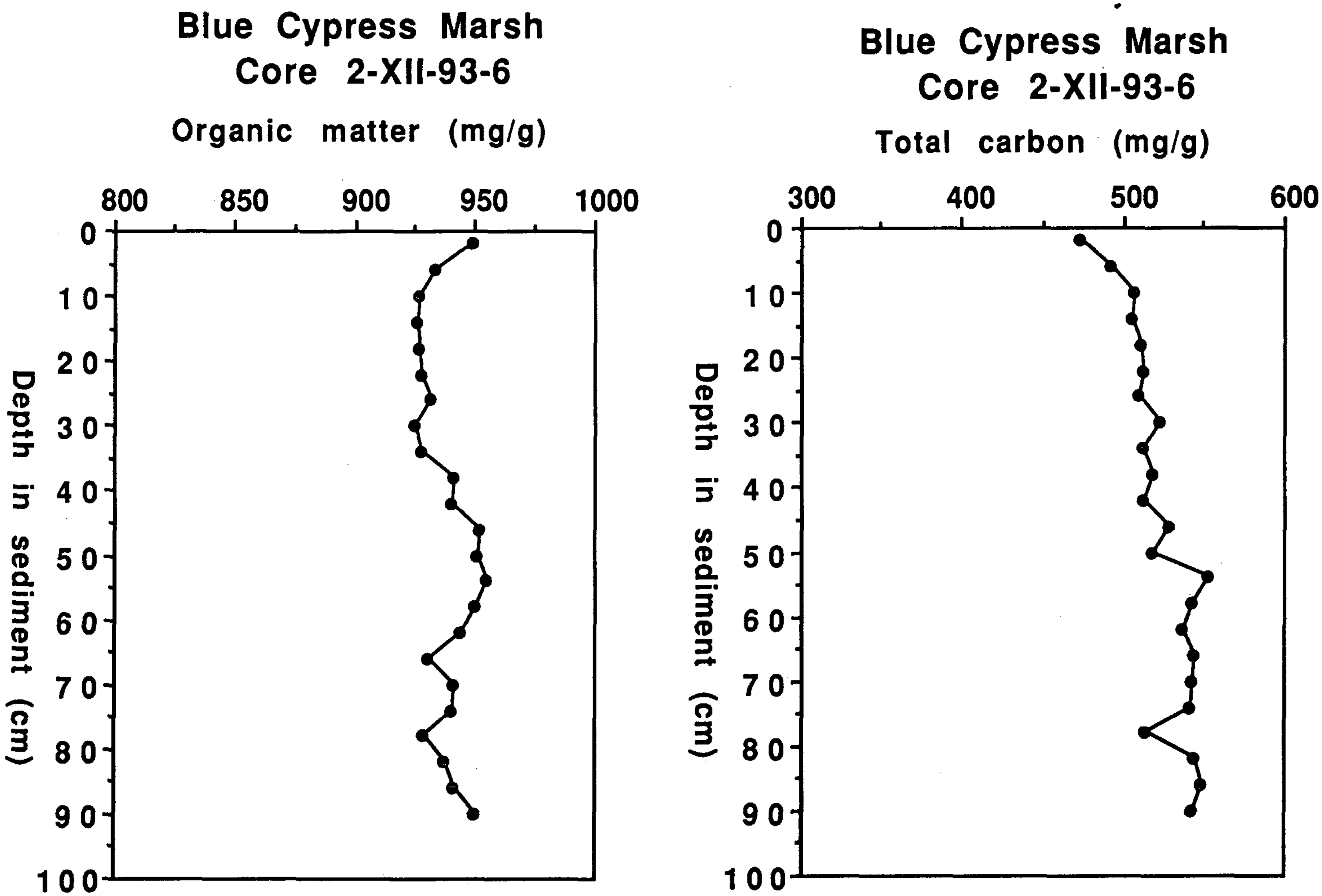


Figure 28. Blue Cypress Marsh Core 2-XII-93-6 organic matter (mg g^{-1}) and total carbon (mg g^{-1}).

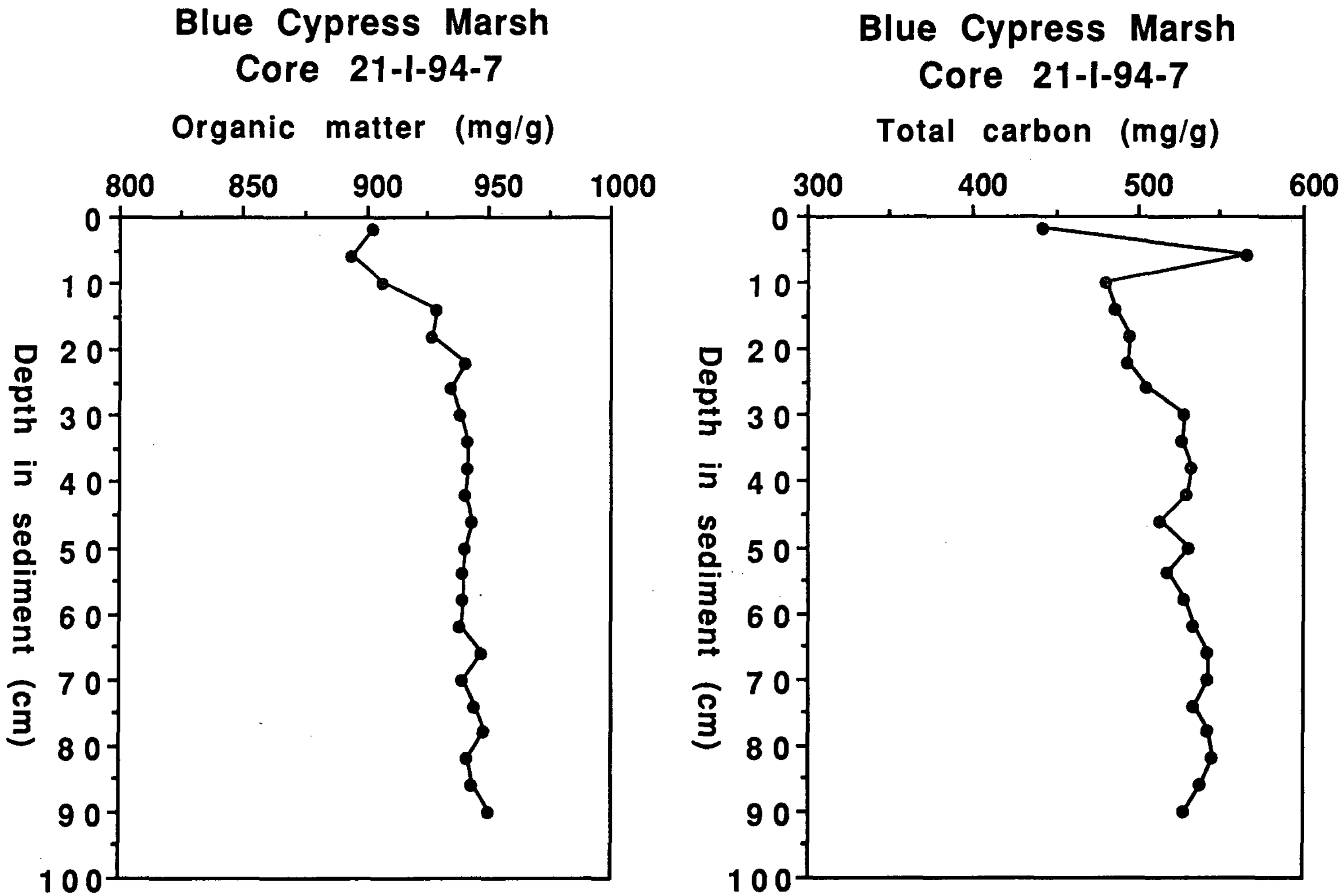


Figure 29. Blue Cypress Marsh Core 21-I-94-7 organic matter (mg g^{-1}) and total carbon (mg g^{-1}).

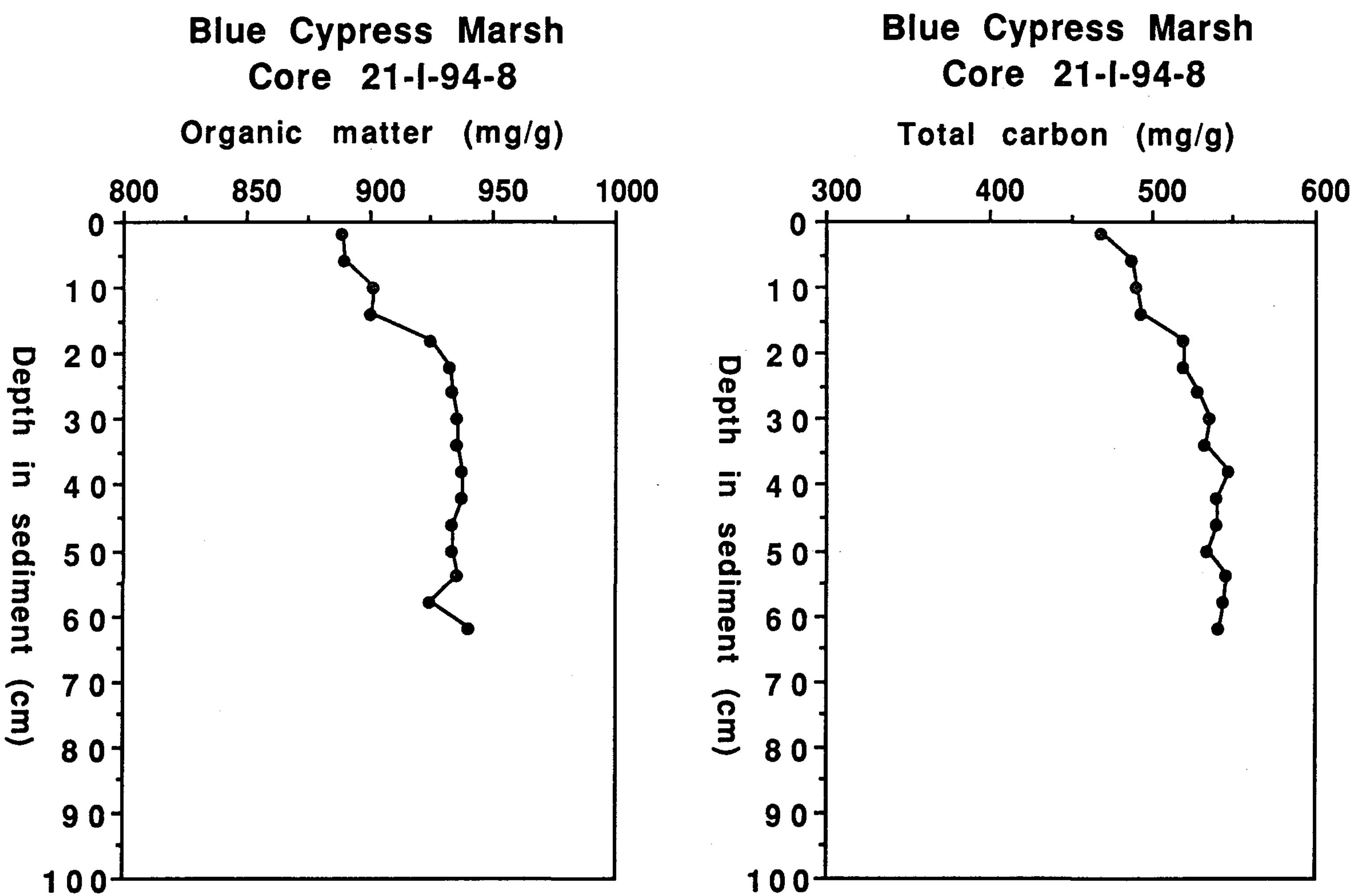


Figure 30. Blue Cypress Marsh Core 21-I-94-8 organic matter (mg g^{-1}) and total carbon (mg g^{-1}).

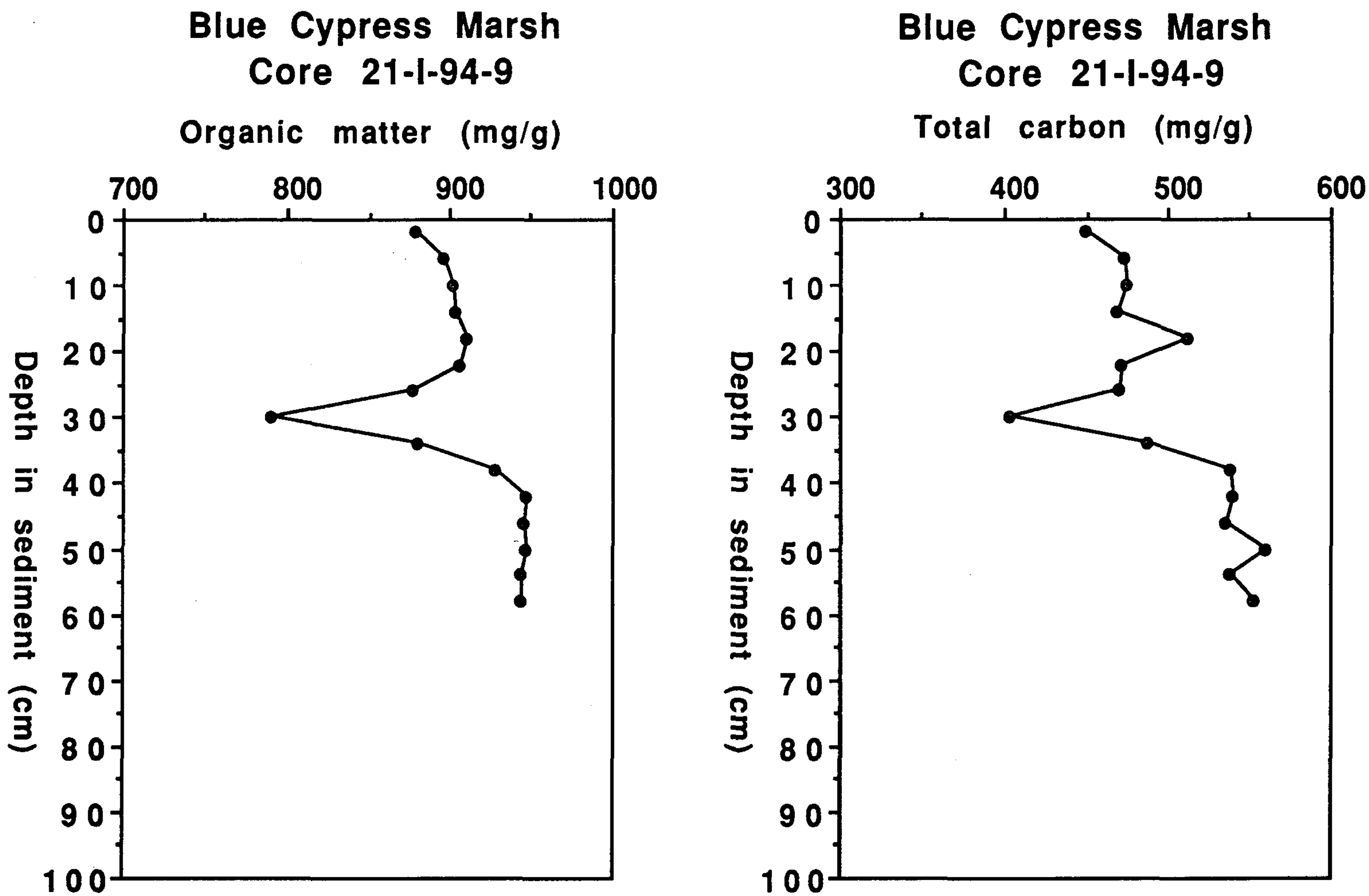


Figure 31. Blue Cypress Marsh Core 21-I-94-9 organic matter (mg g^{-1}) and total carbon (mg g^{-1}).

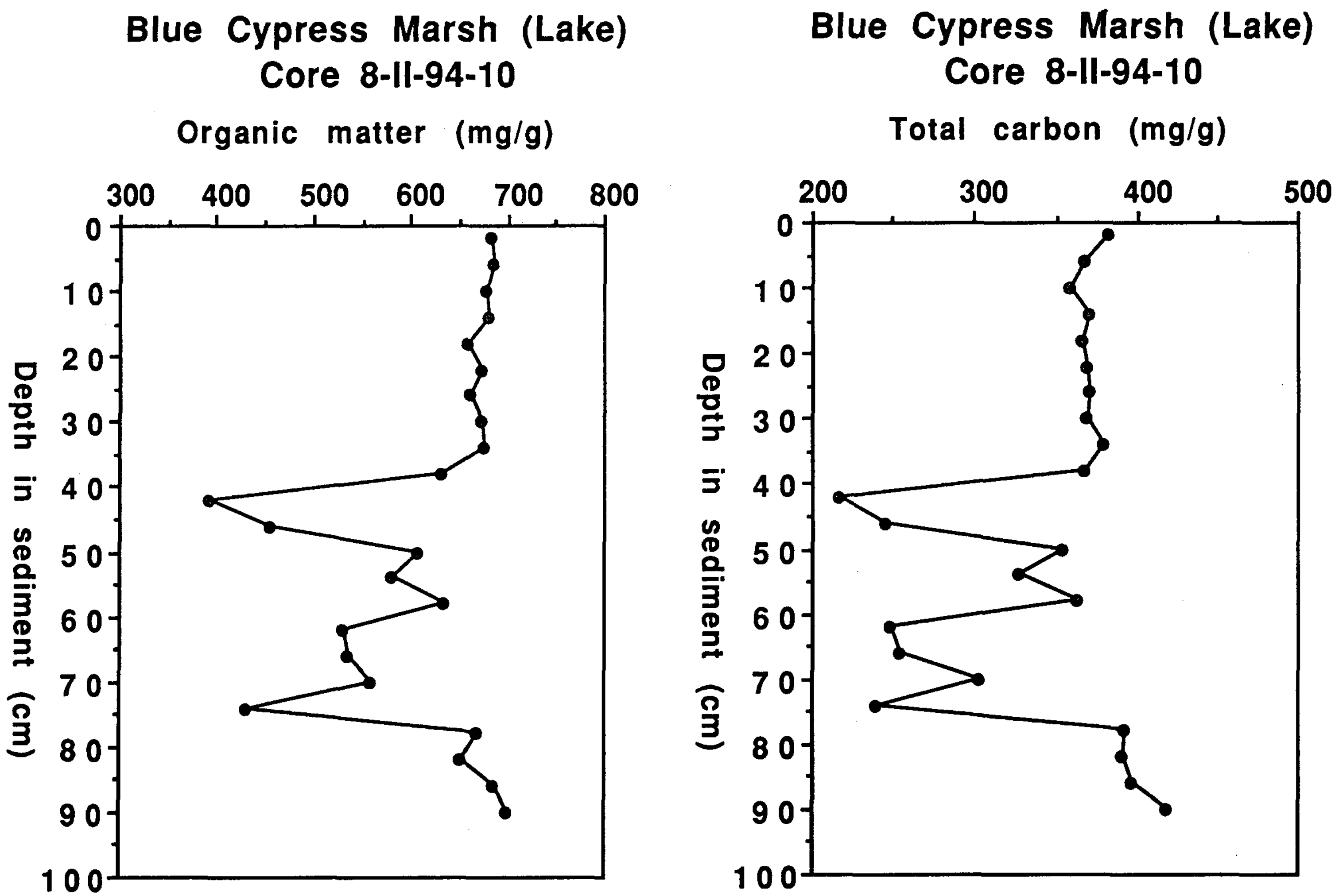


Figure 32. Blue Cypress Marsh Core (Lake) 8-II-94-10 organic matter (mg g^{-1}) and total carbon (mg g^{-1}).

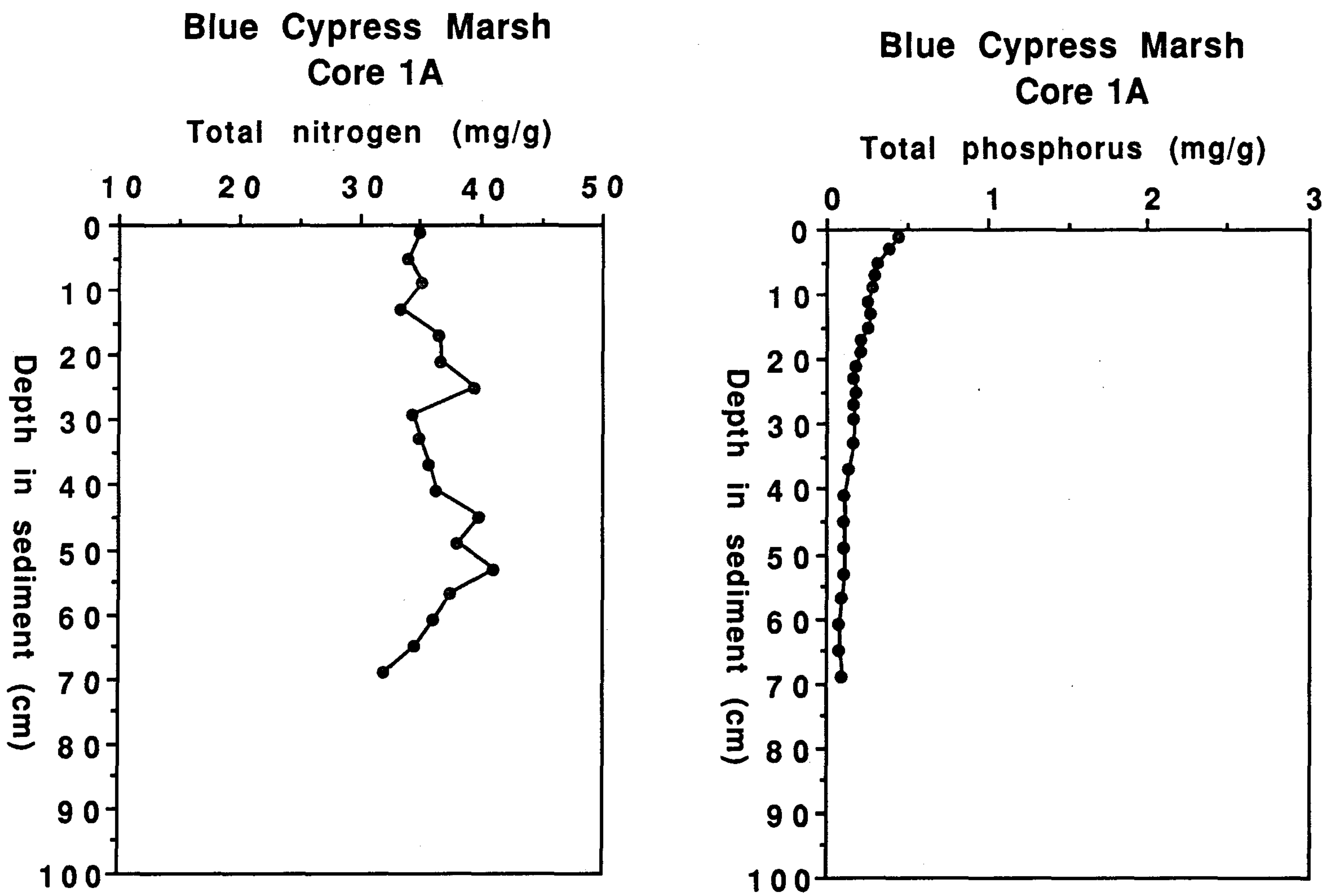


Figure 33. Blue Cypress Marsh Core 1A total nitrogen (mg g^{-1}) and total phosphorus (mg g^{-1}).

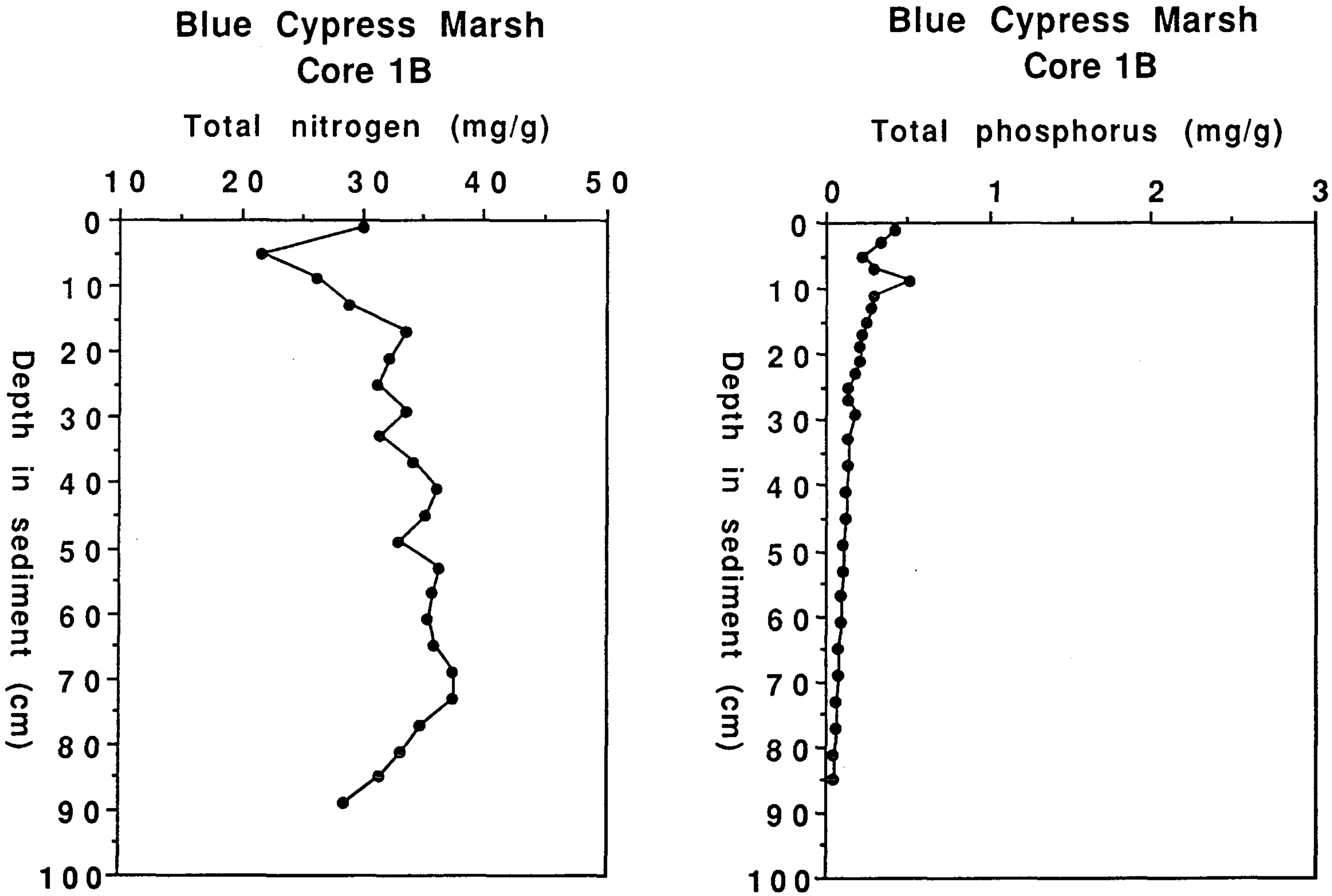


Figure 34. Blue Cypress Marsh Core 1B total nitrogen (mg g^{-1}) and total phosphorus (mg g^{-1}).

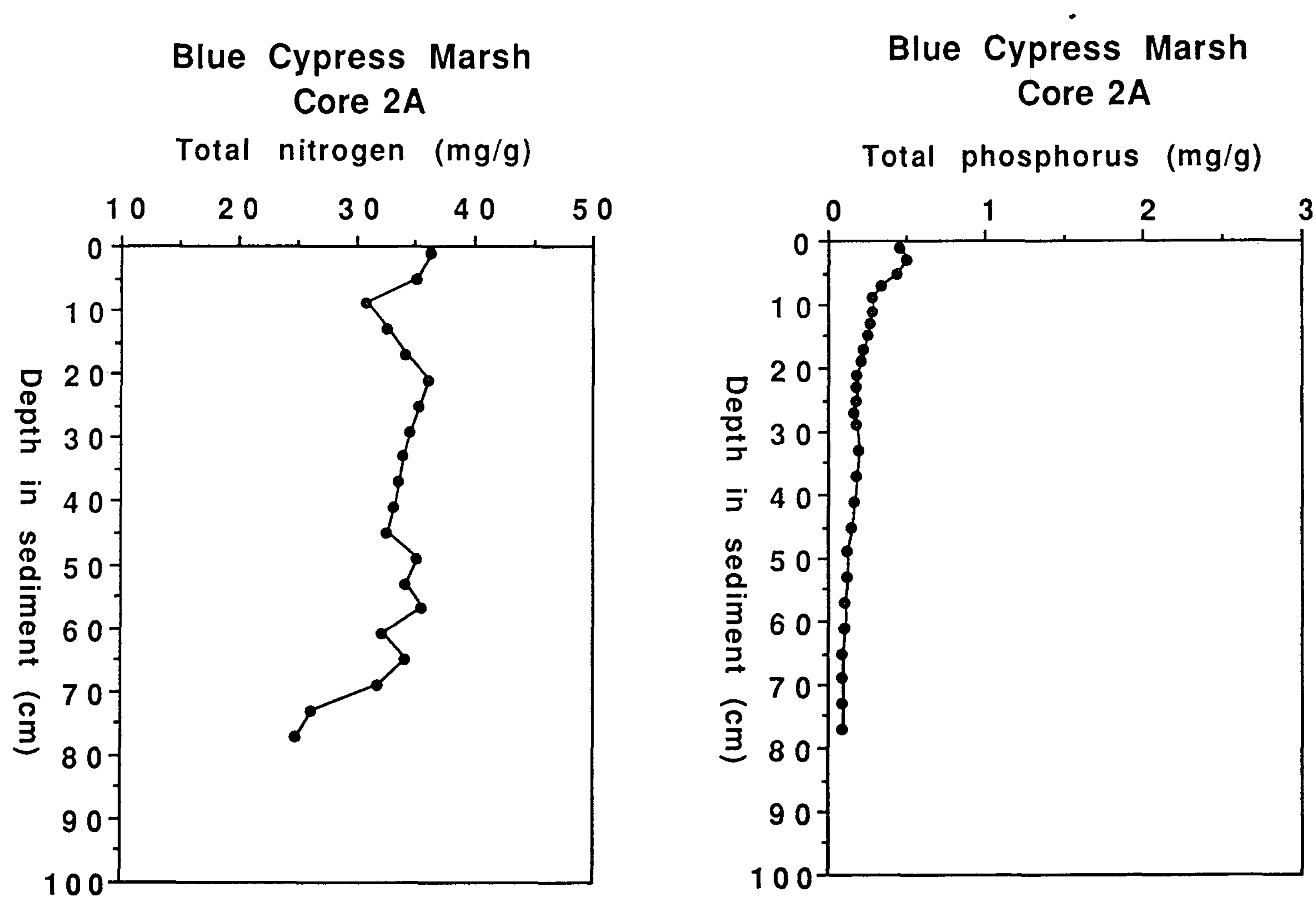


Figure 35. Blue Cypress Marsh Core 2A total nitrogen (mg g^{-1}) and total phosphorus (mg g^{-1}).

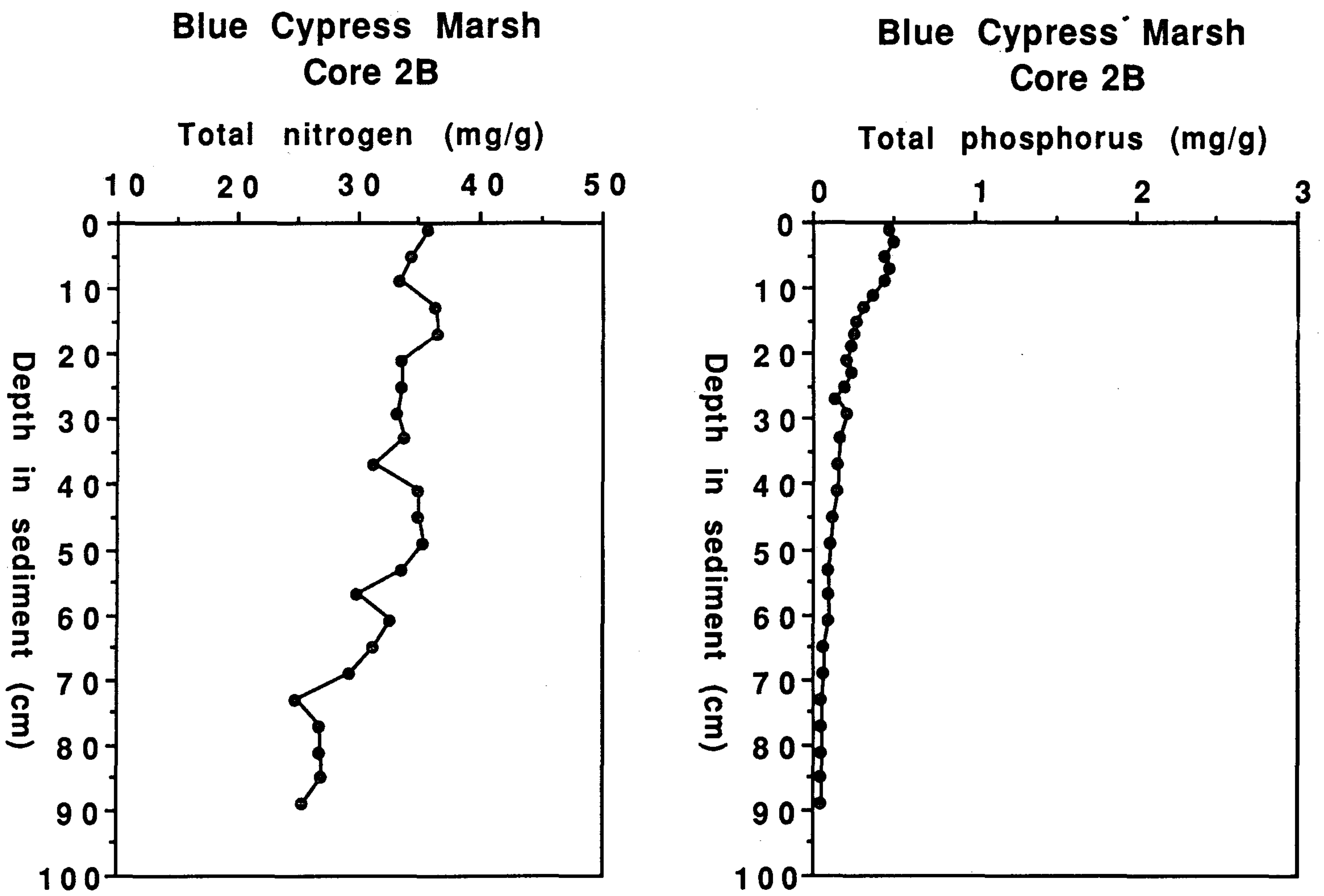


Figure 36. Blue Cypress Marsh Core 2B total nitrogen (mg g^{-1}) and total phosphorus (mg g^{-1}).

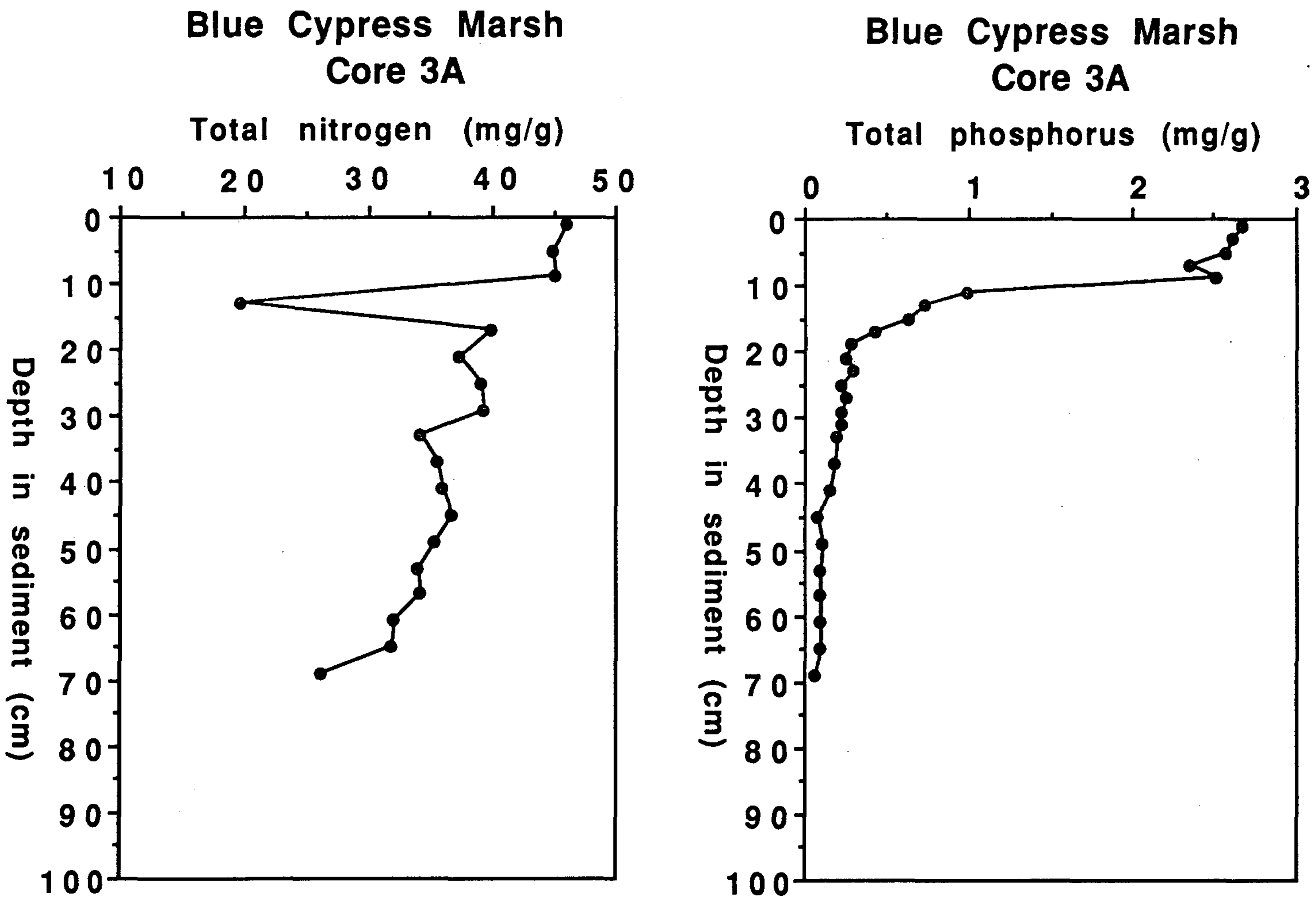


Figure 37. Blue Cypress Marsh Core 3A total nitrogen (mg g^{-1}) and total phosphorus (mg g^{-1}).

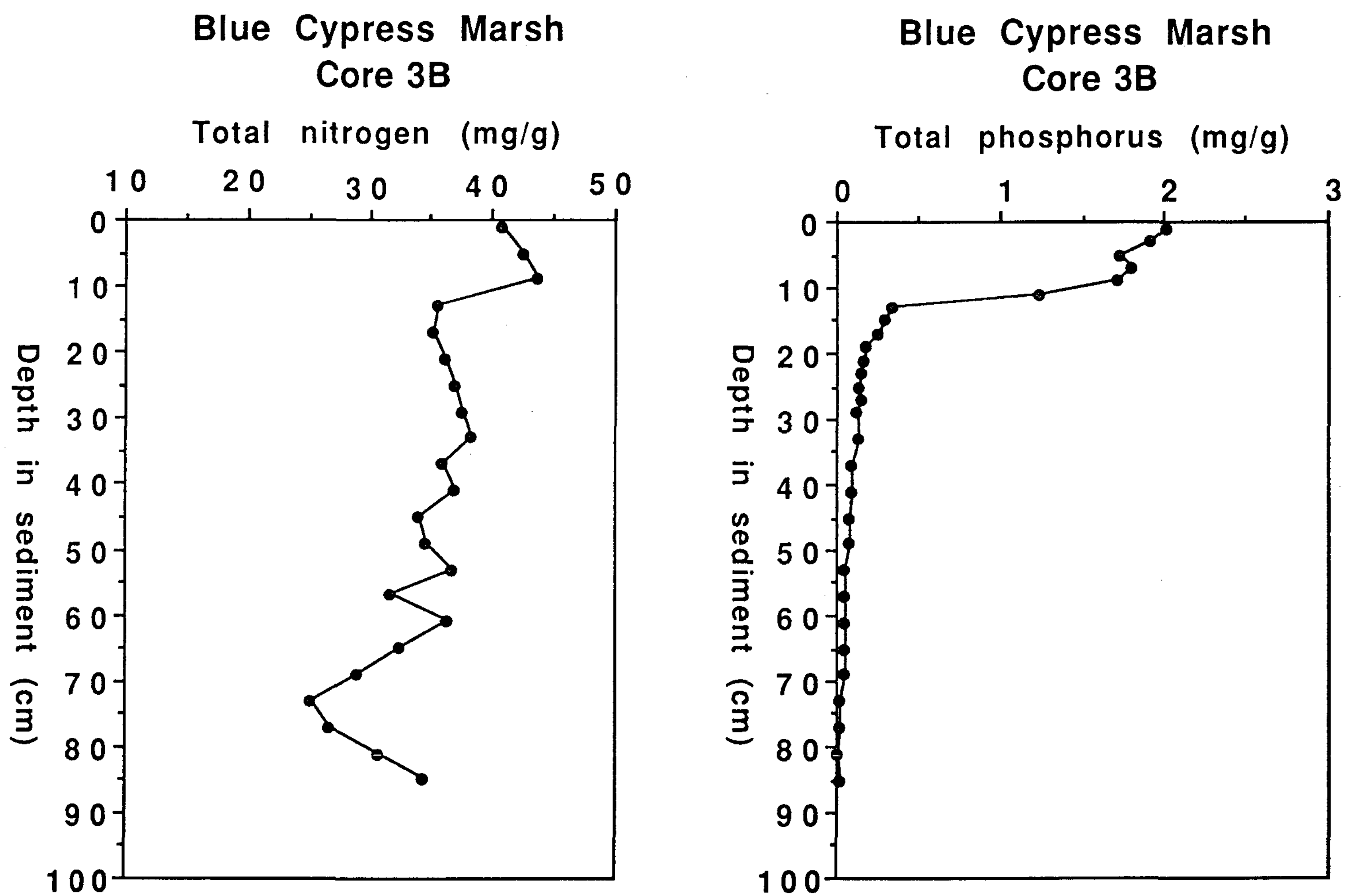


Figure 38. Blue Cypress Marsh Core 3B total nitrogen (mg g^{-1}) and total phosphorus (mg g^{-1}).

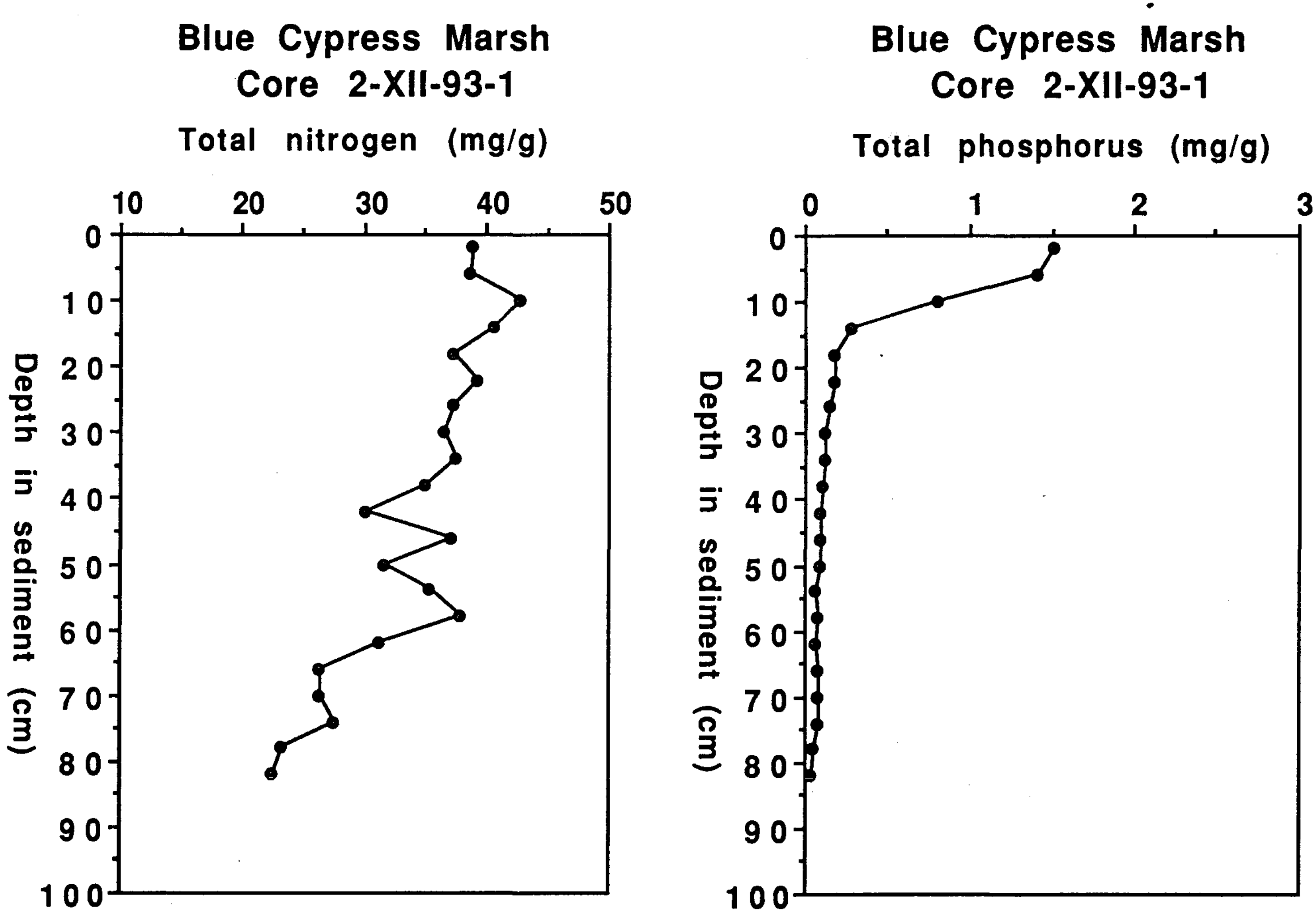


Figure 39. Blue Cypress Marsh Core 2-XII-93-1 total nitrogen (mg g^{-1}) and total phosphorus (mg g^{-1}).

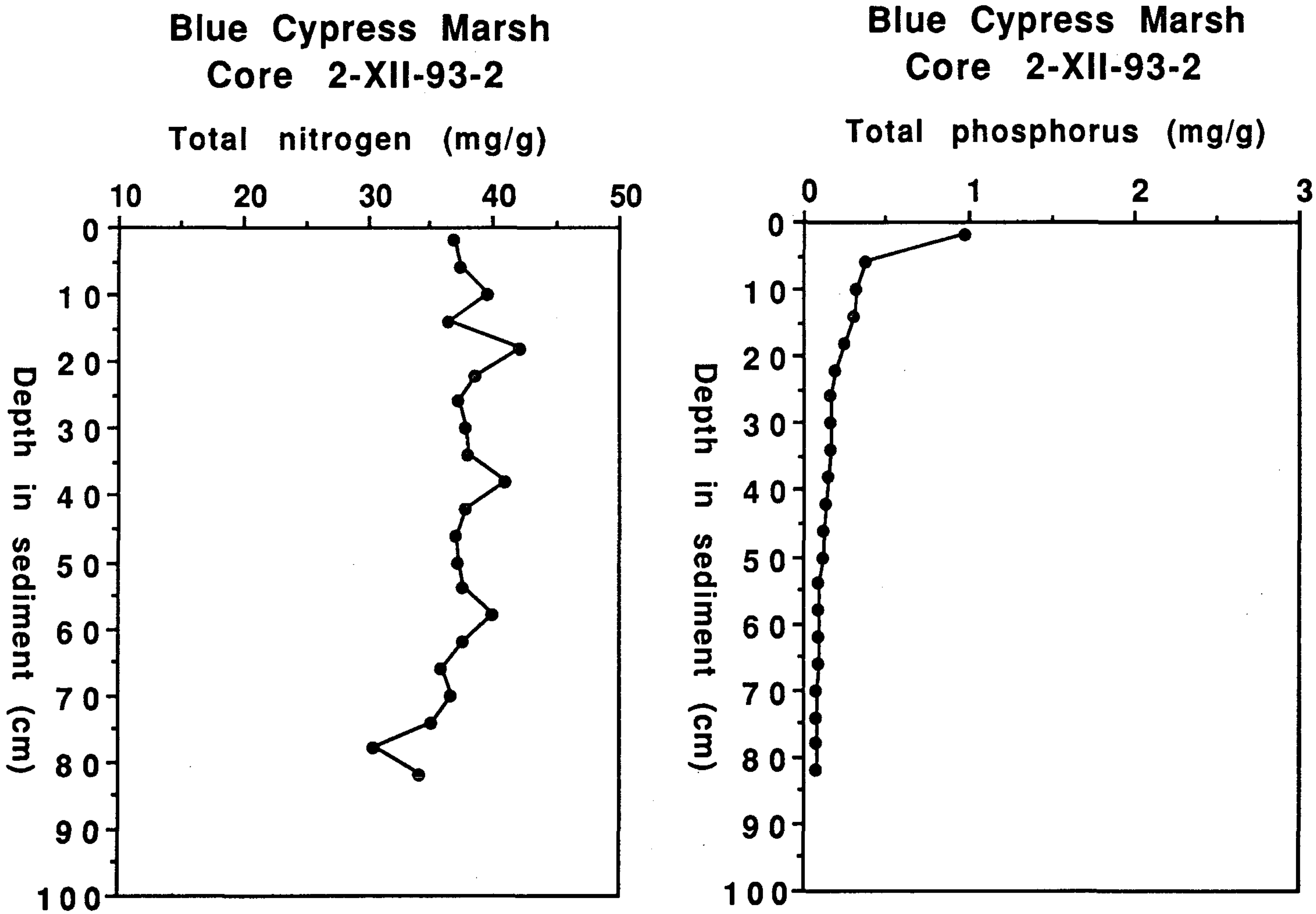


Figure 40. Blue Cypress Marsh Core 2-XII-93-2 total nitrogen (mg g^{-1}) and total phosphorus (mg g^{-1}).

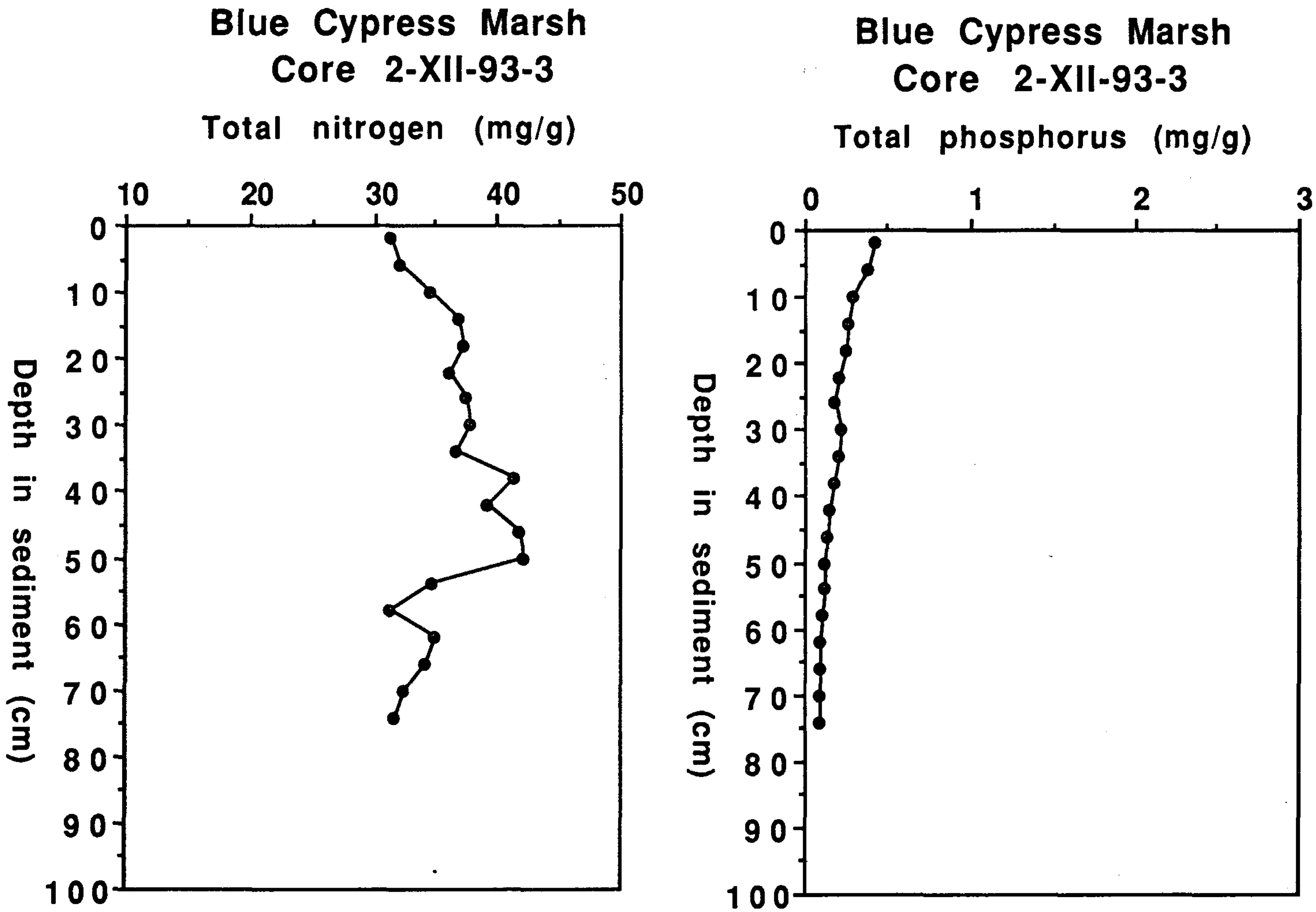


Figure 41. Blue Cypress Marsh Core 2-XII-93-3 total nitrogen (mg g^{-1}) and total phosphorus (mg g^{-1}).

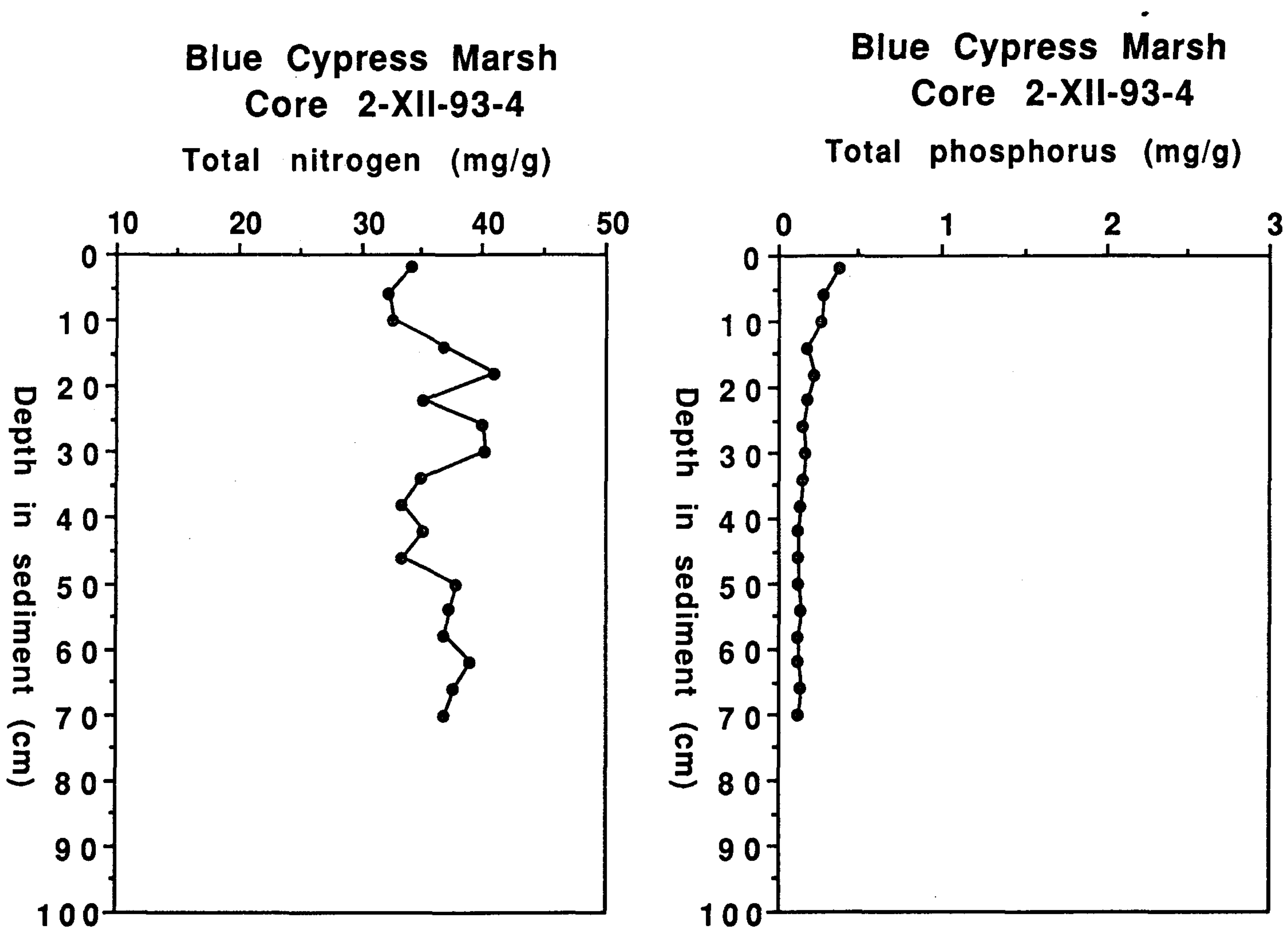


Figure 42. Blue Cypress Marsh Core 2-XII-93-4 total nitrogen (mg g^{-1}) and total phosphorus (mg g^{-1}).

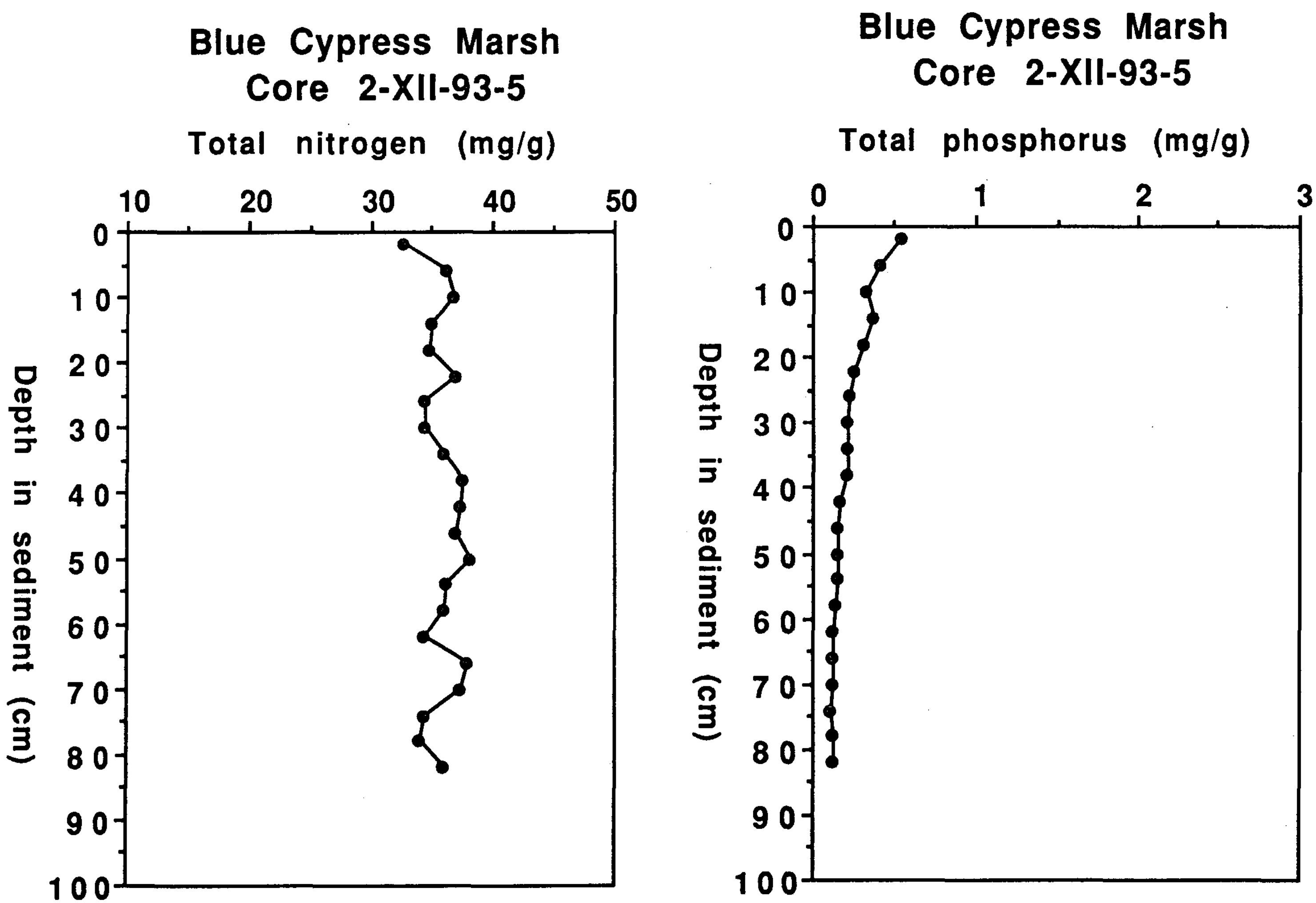


Figure 43. Blue Cypress Marsh Core 2-XII-93-5 total nitrogen (mg g^{-1}) and total phosphorus (mg g^{-1}).

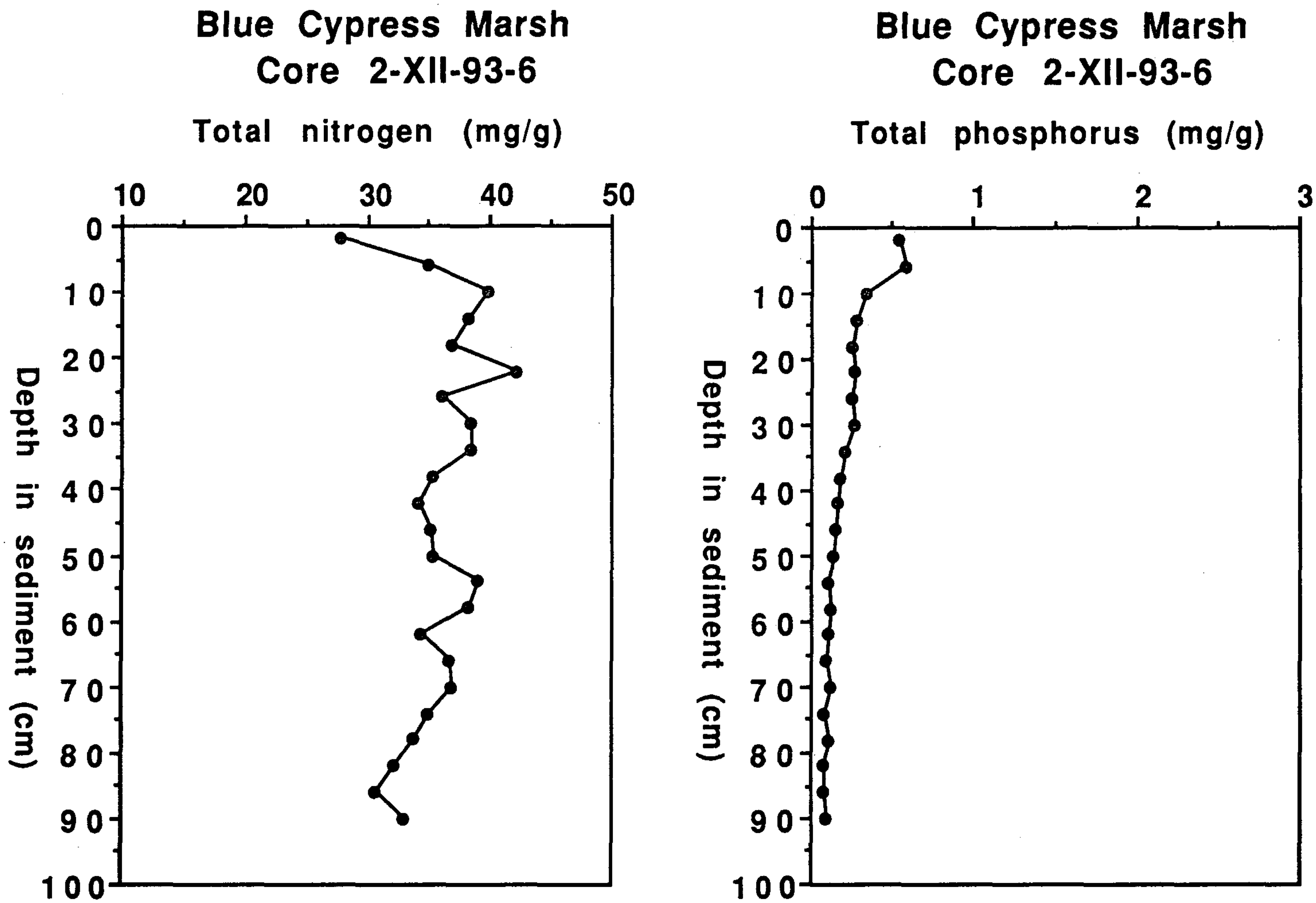


Figure 44. Blue Cypress Marsh Core 2-XII-93-6 total nitrogen (mg g^{-1}) and total phosphorus (mg g^{-1}).

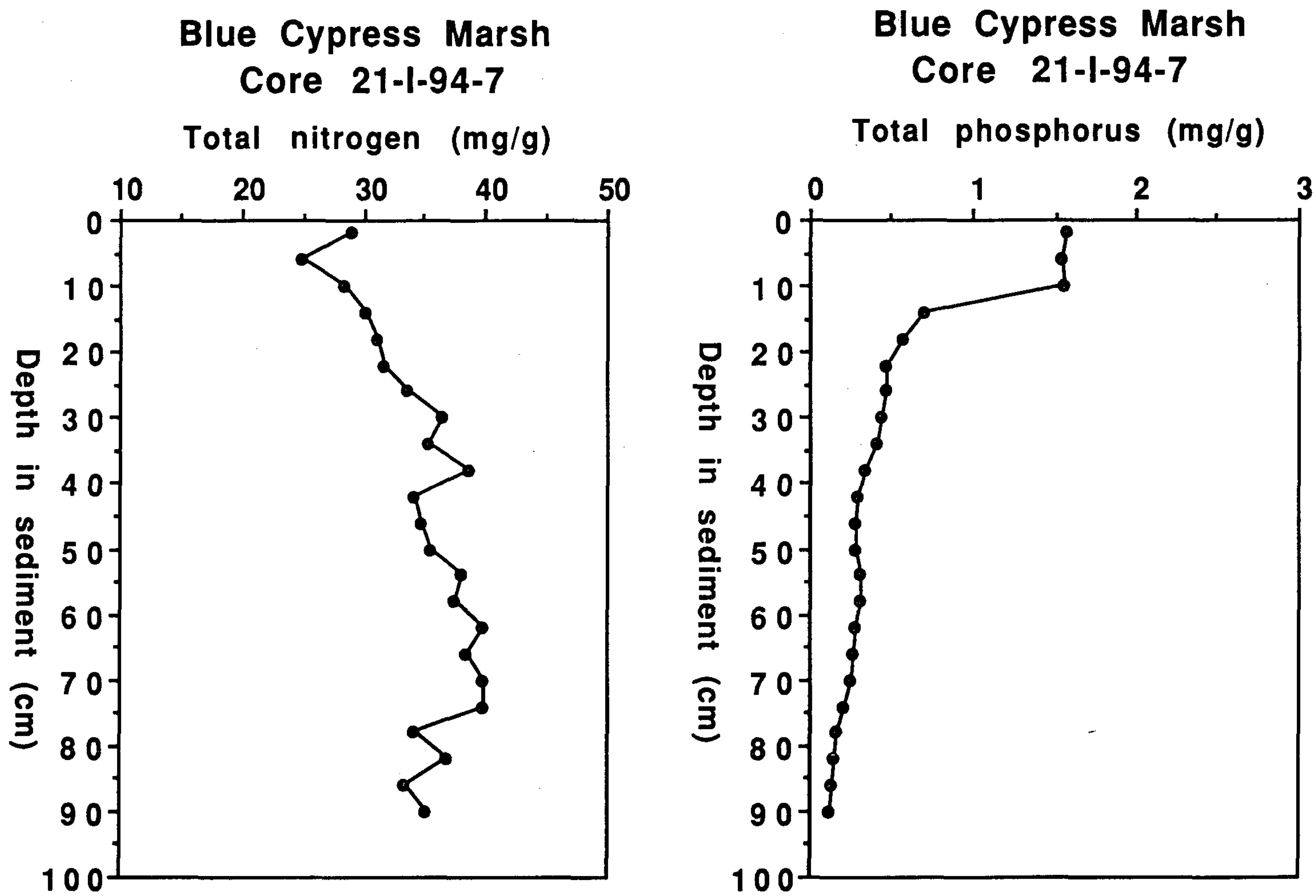


Figure 45. Blue Cypress Marsh Core 21-I-94-7 total nitrogen (mg g^{-1}) and total phosphorus (mg g^{-1}).

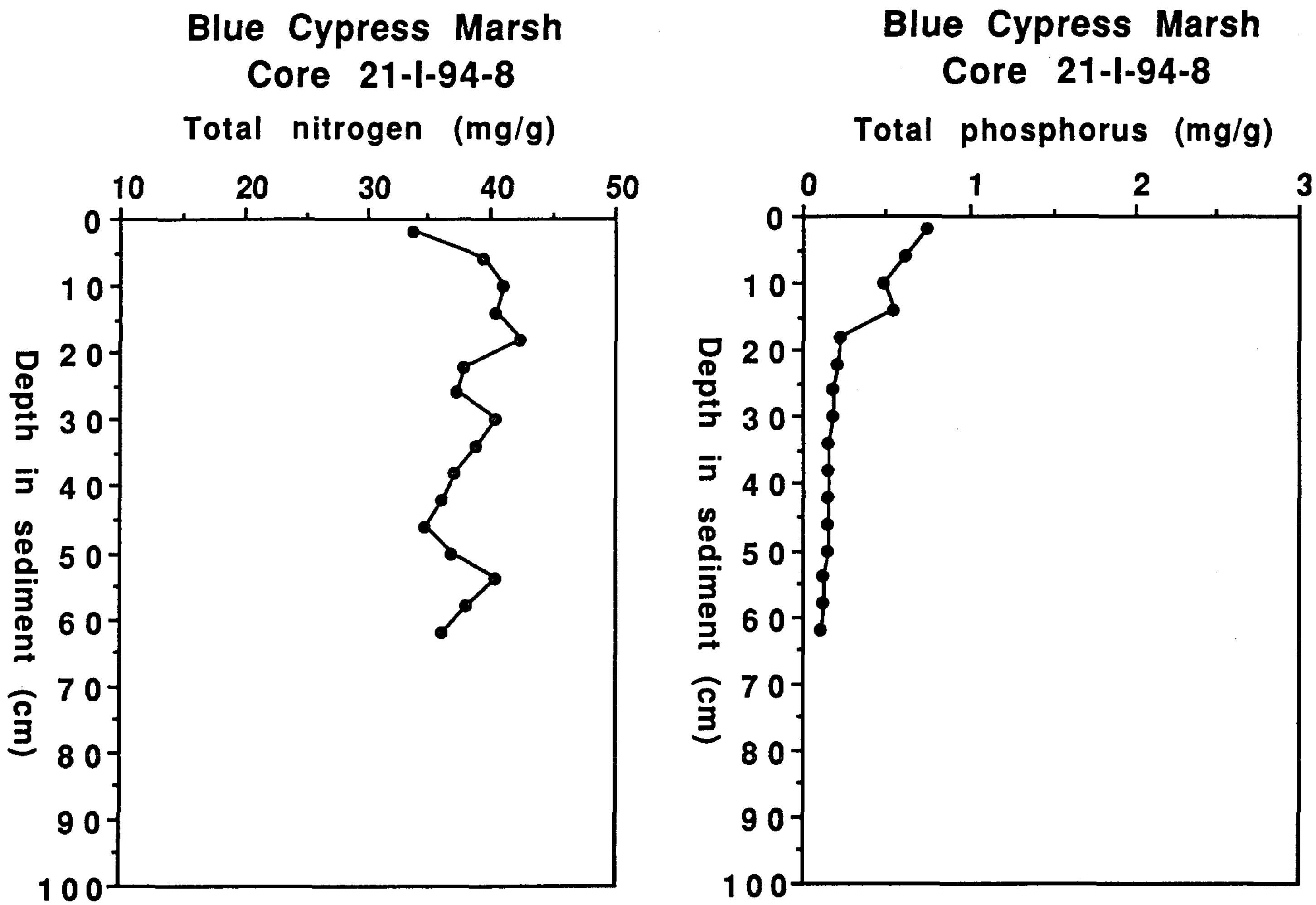


Figure 46. Blue Cypress Marsh Core 21-I-94-8 total nitrogen (mg g^{-1}) and total phosphorus (mg g^{-1}).

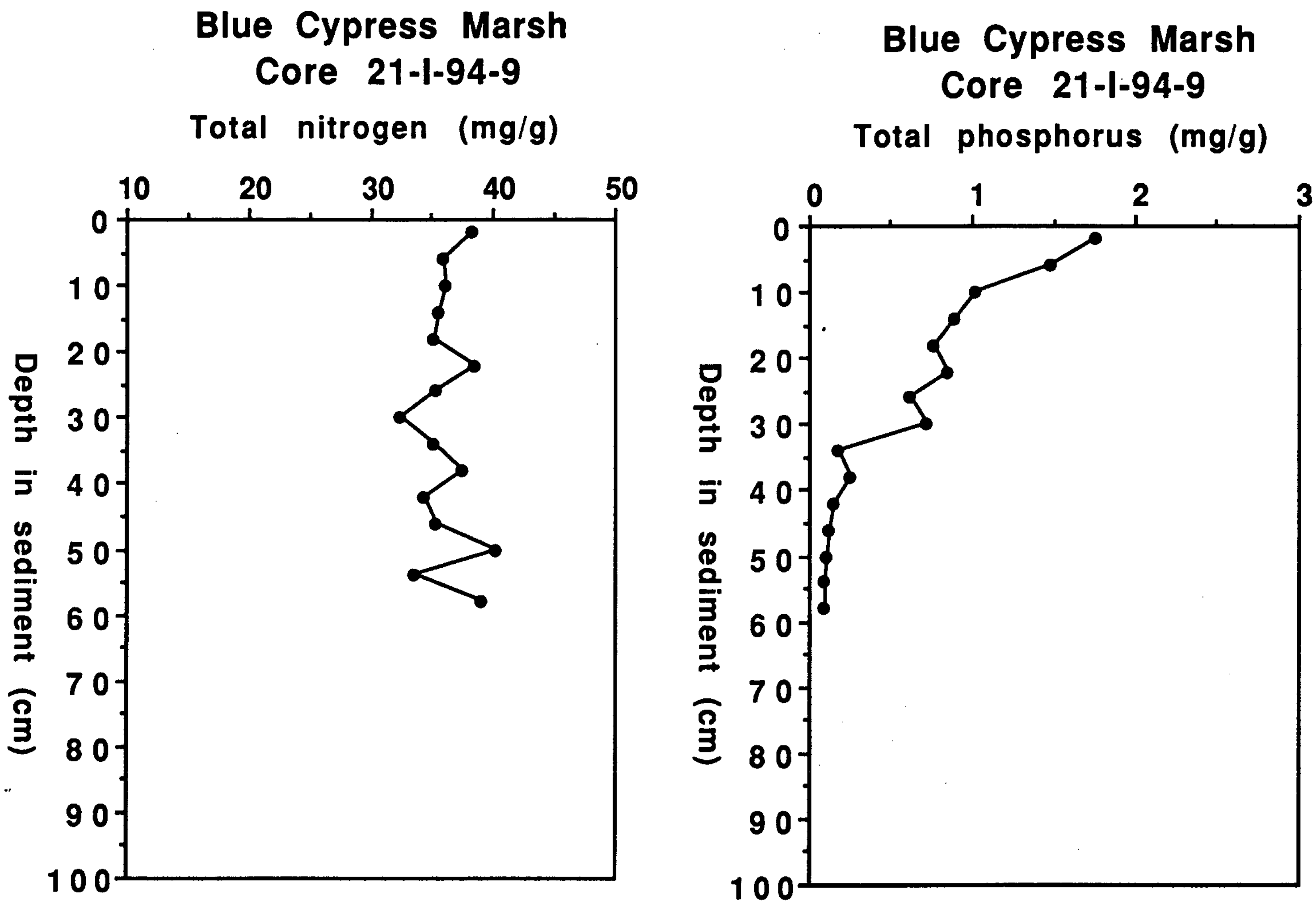


Figure 47. Blue Cypress Marsh Core 21-I-94-9 total nitrogen (mg g^{-1}) and total phosphorus (mg g^{-1}).

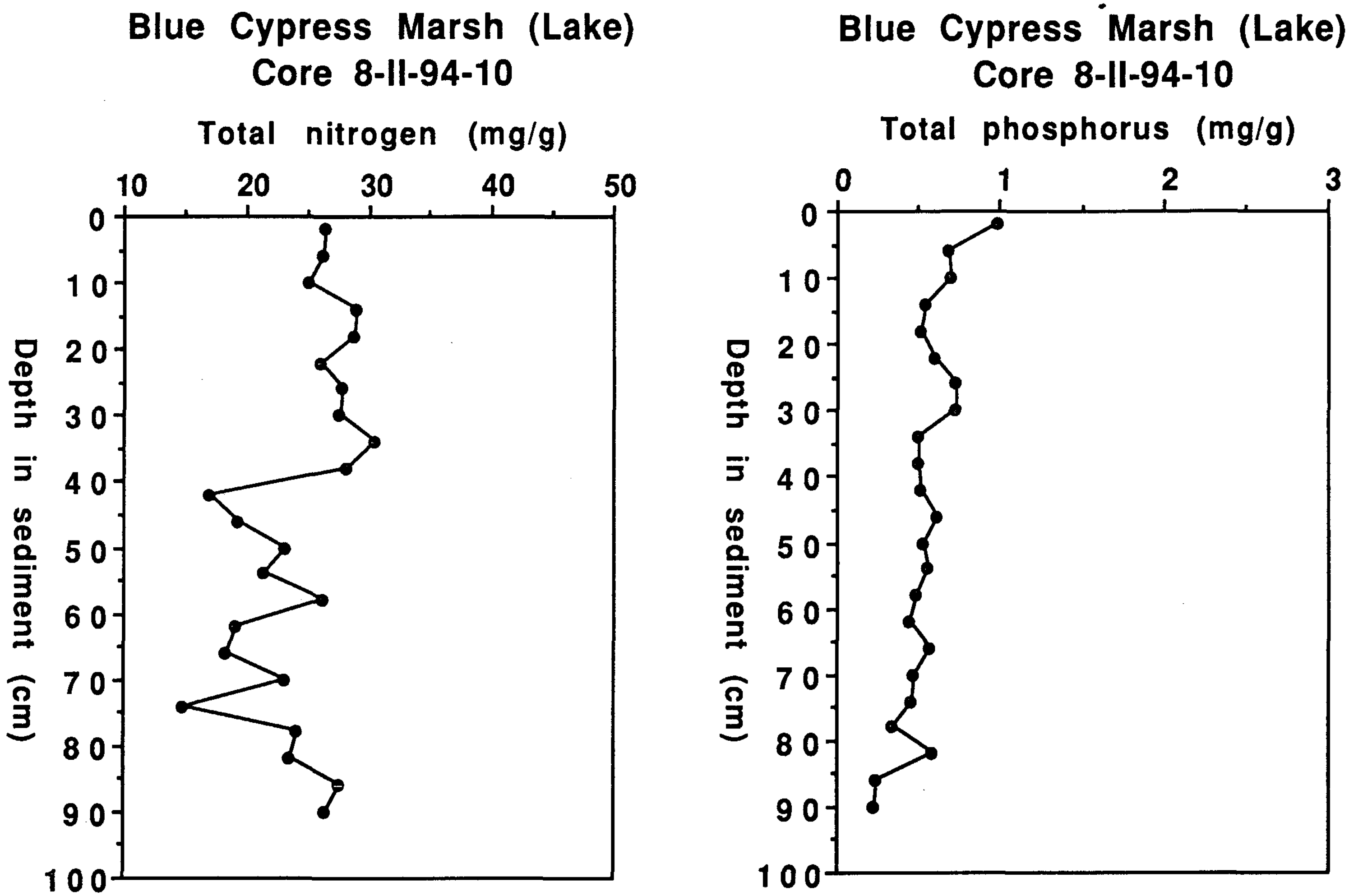
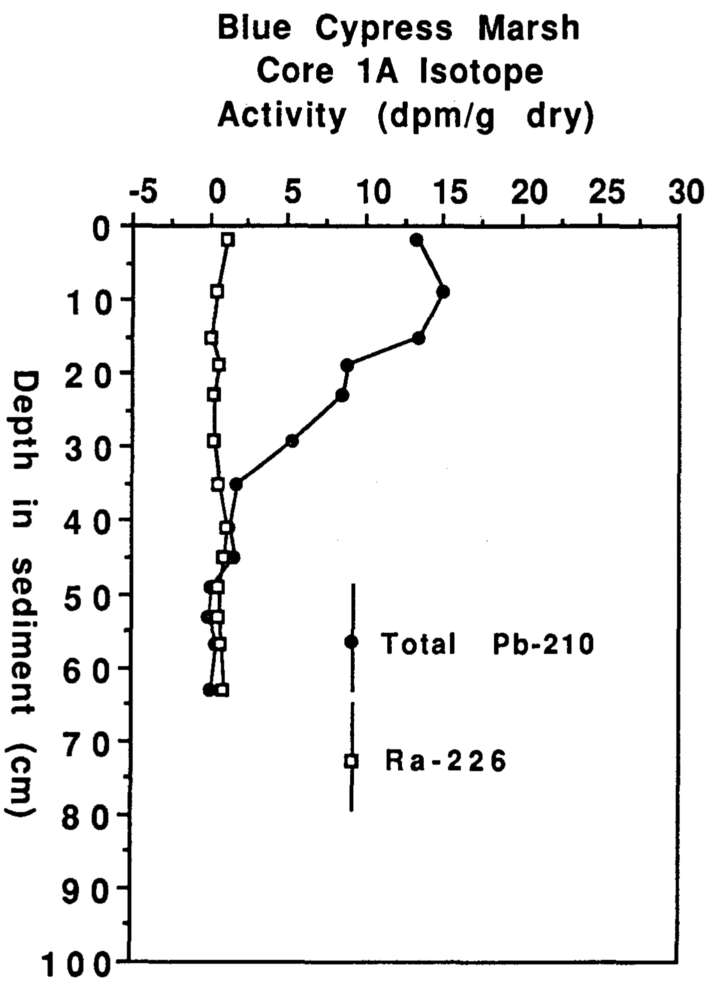


Figure 48. Blue Cypress Marsh Core (Lake) 8-II-94-10 total nitrogen (mg g^{-1}) and total phosphorus (mg g^{-1}).



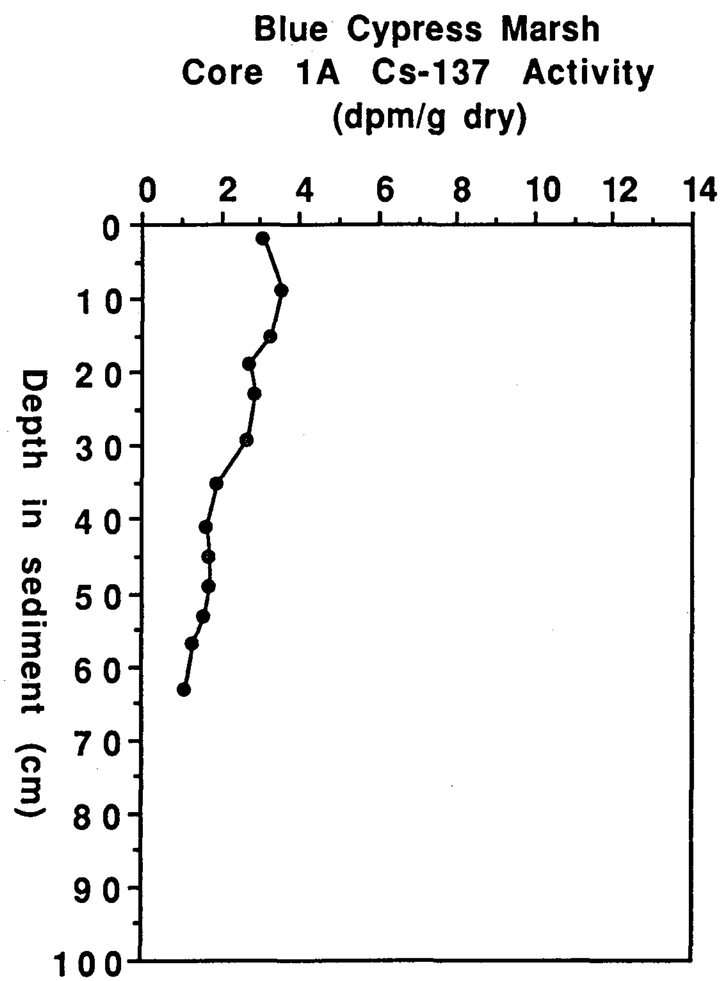


Figure 49. Blue Cypress Marsh Core 1A total ^{210}Pb & ^{226}Ra activity (dpm g^{-1} dry) and ^{137}Cs activity (dpm g^{-1} dry).

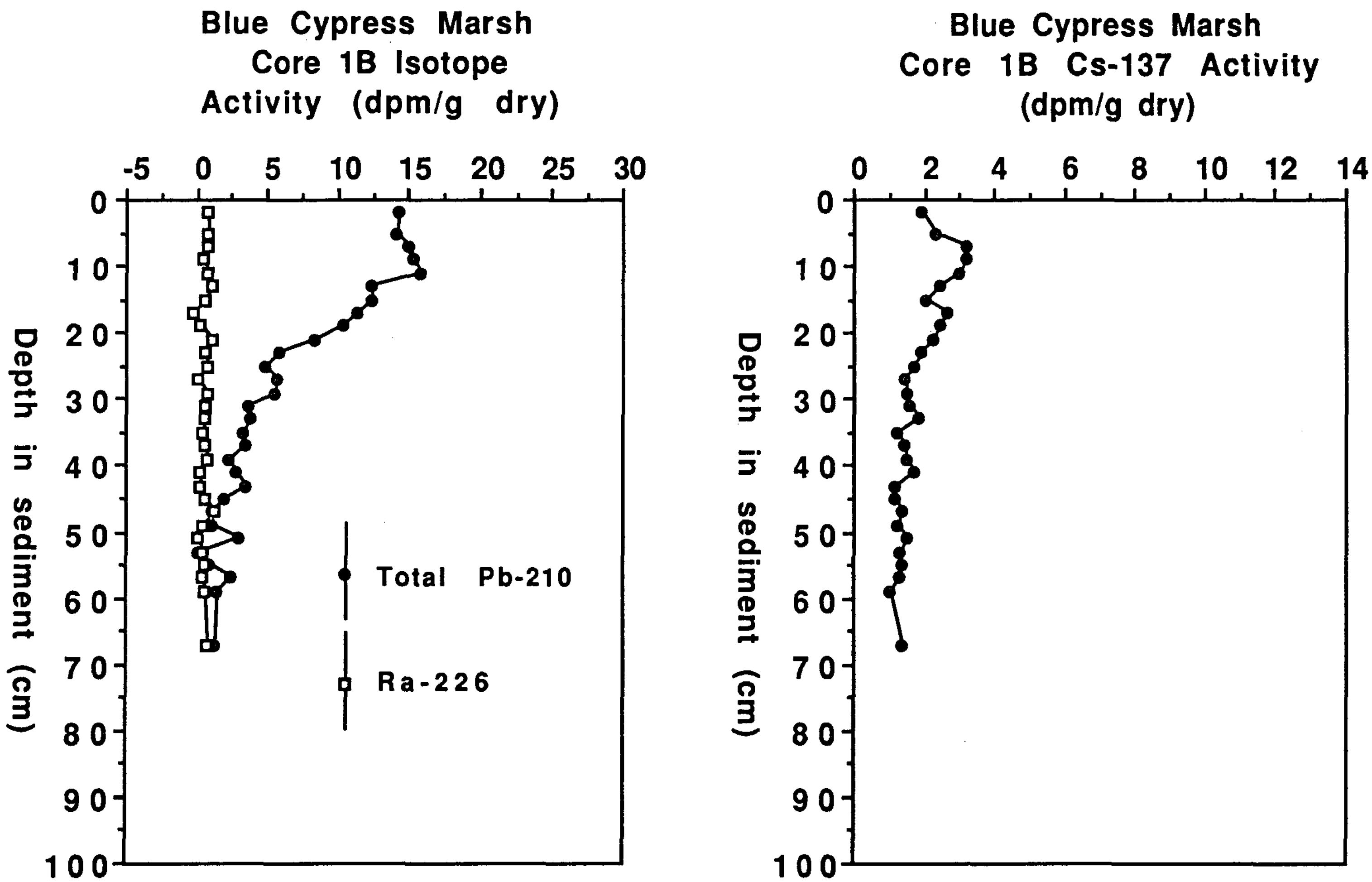


Figure 50. Blue Cypress Marsh Core 1B total ^{210}Pb & ^{226}Ra activity (dpm g^{-1} dry) and ^{137}Cs activity (dpm g^{-1} dry).

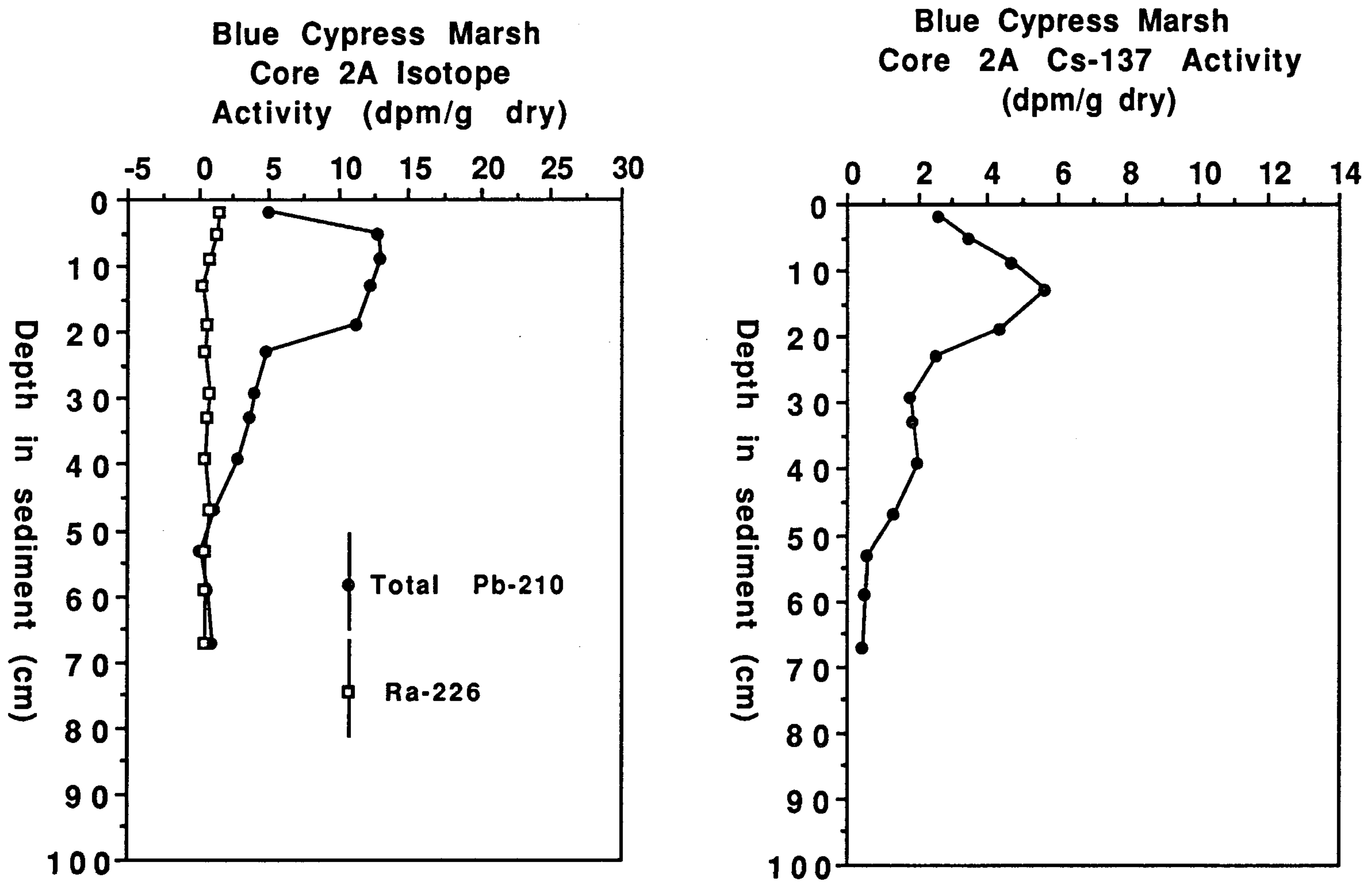


Figure 51. Blue Cypress Marsh Core 2A total ^{210}Pb & ^{226}Ra activity (dpm g^{-1} dry) and ^{137}Cs activity (dpm g^{-1} dry).

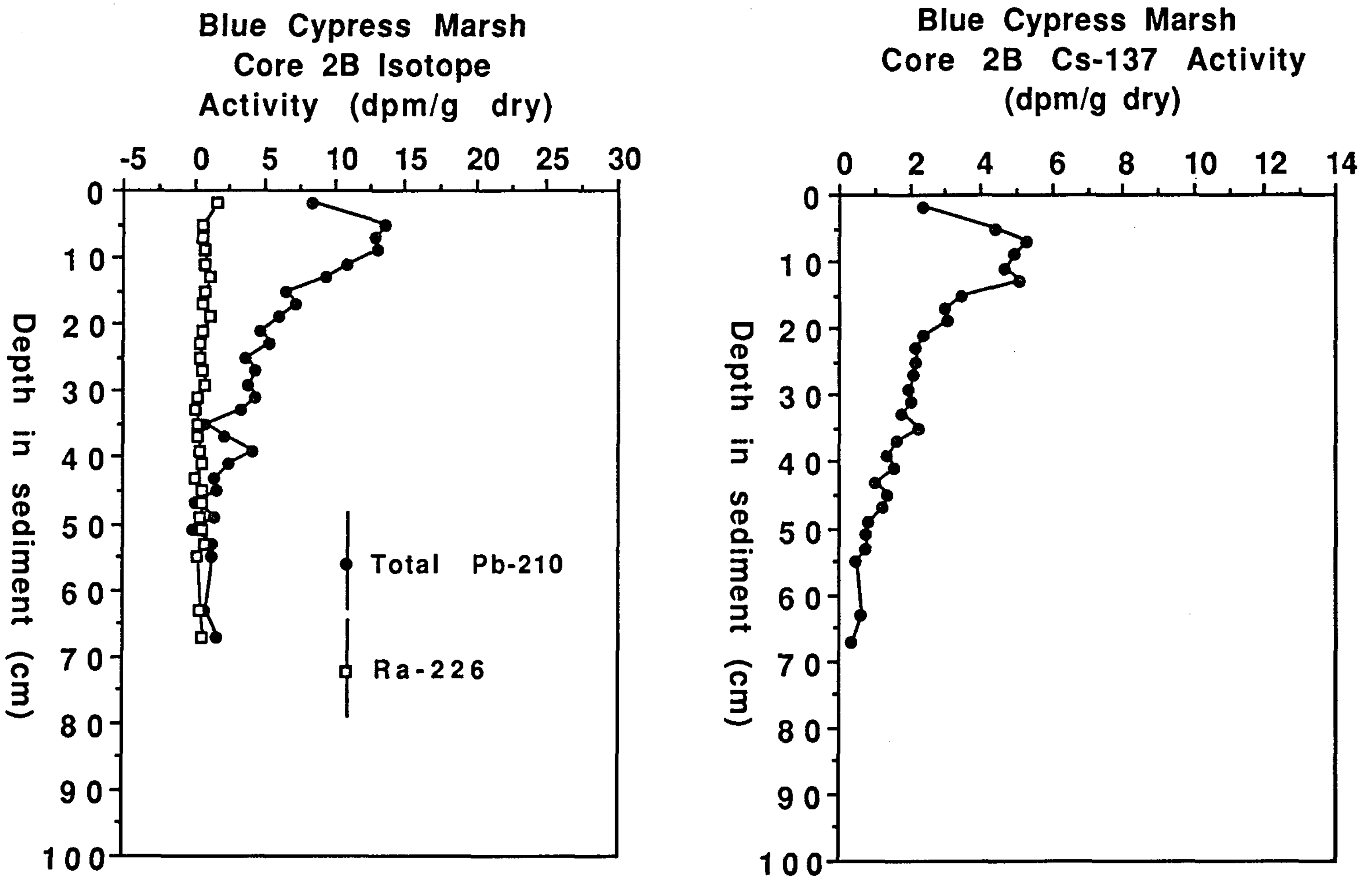


Figure 52. Blue Cypress Marsh Core 2B total ^{210}Pb & ^{226}Ra activity (dpm g^{-1} dry) and ^{137}Cs activity (dpm g^{-1} dry).

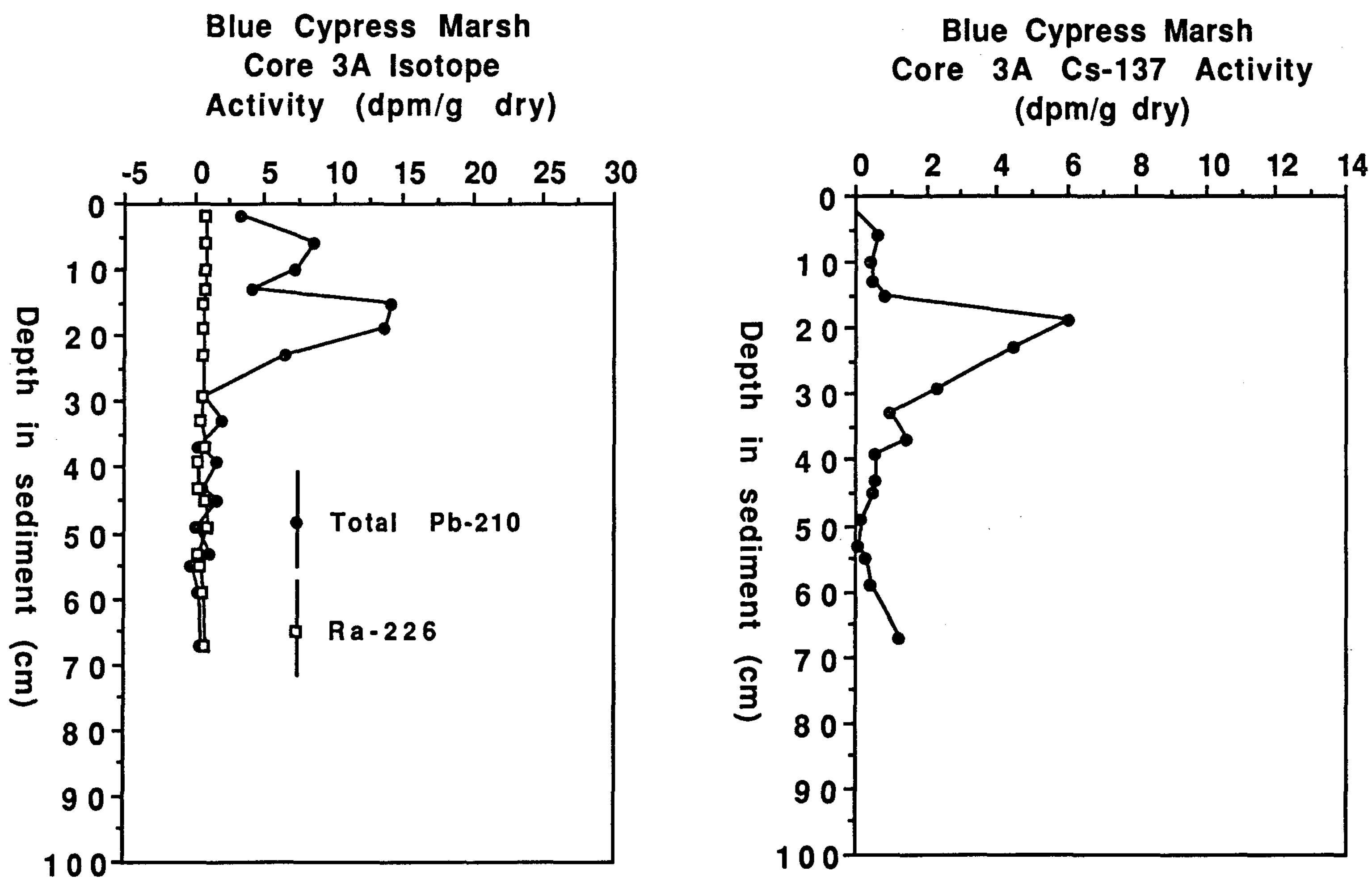


Figure 53. Blue Cypress Marsh Core 3A total ^{210}Pb & ^{226}Ra activity (dpm g^{-1} dry) and ^{137}Cs activity (dpm g^{-1} dry).

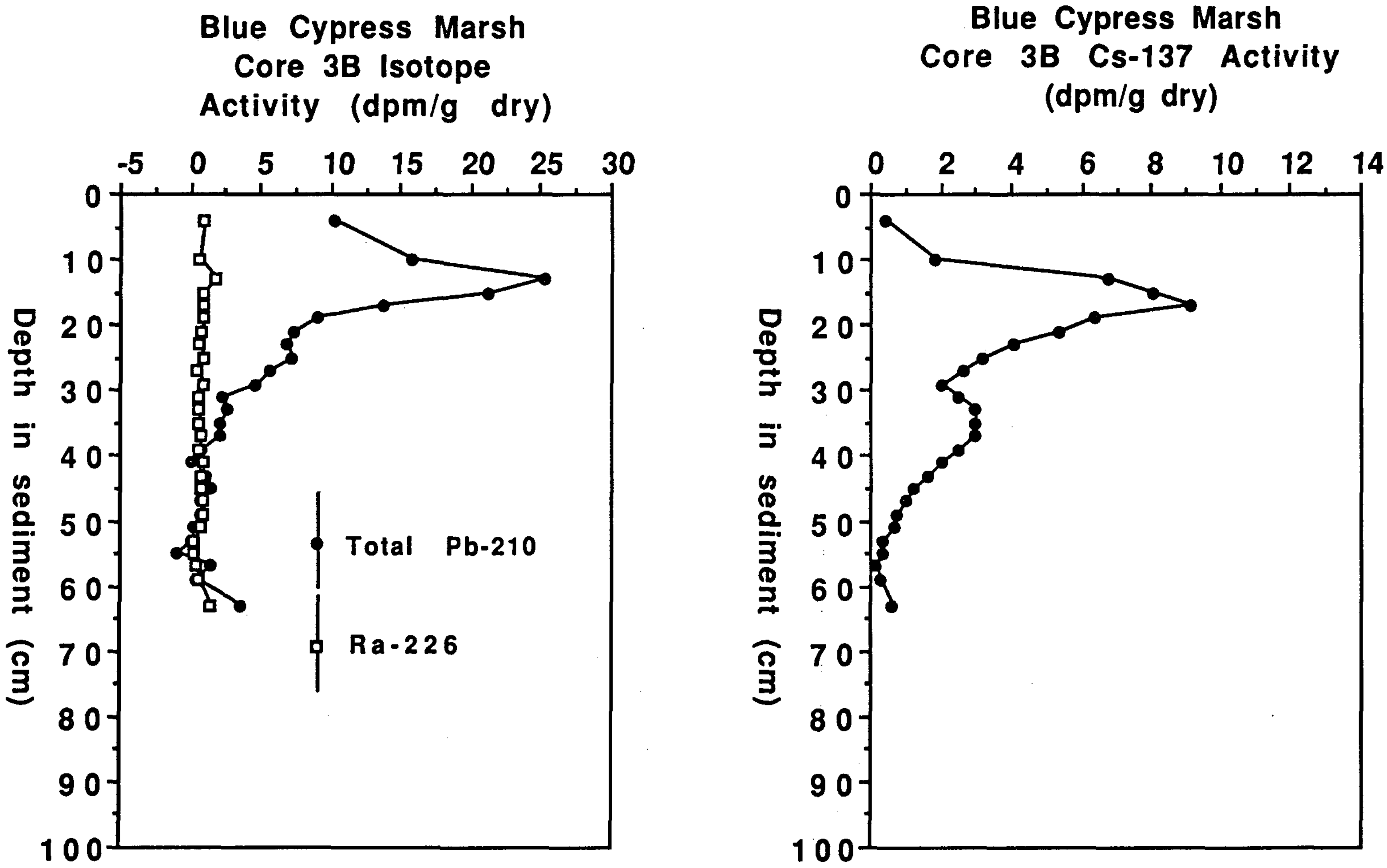


Figure 54. Blue Cypress Marsh Core 3B total ^{210}Pb & ^{226}Ra activity (dpm g^{-1} dry) and ^{137}Cs activity (dpm g^{-1} dry).

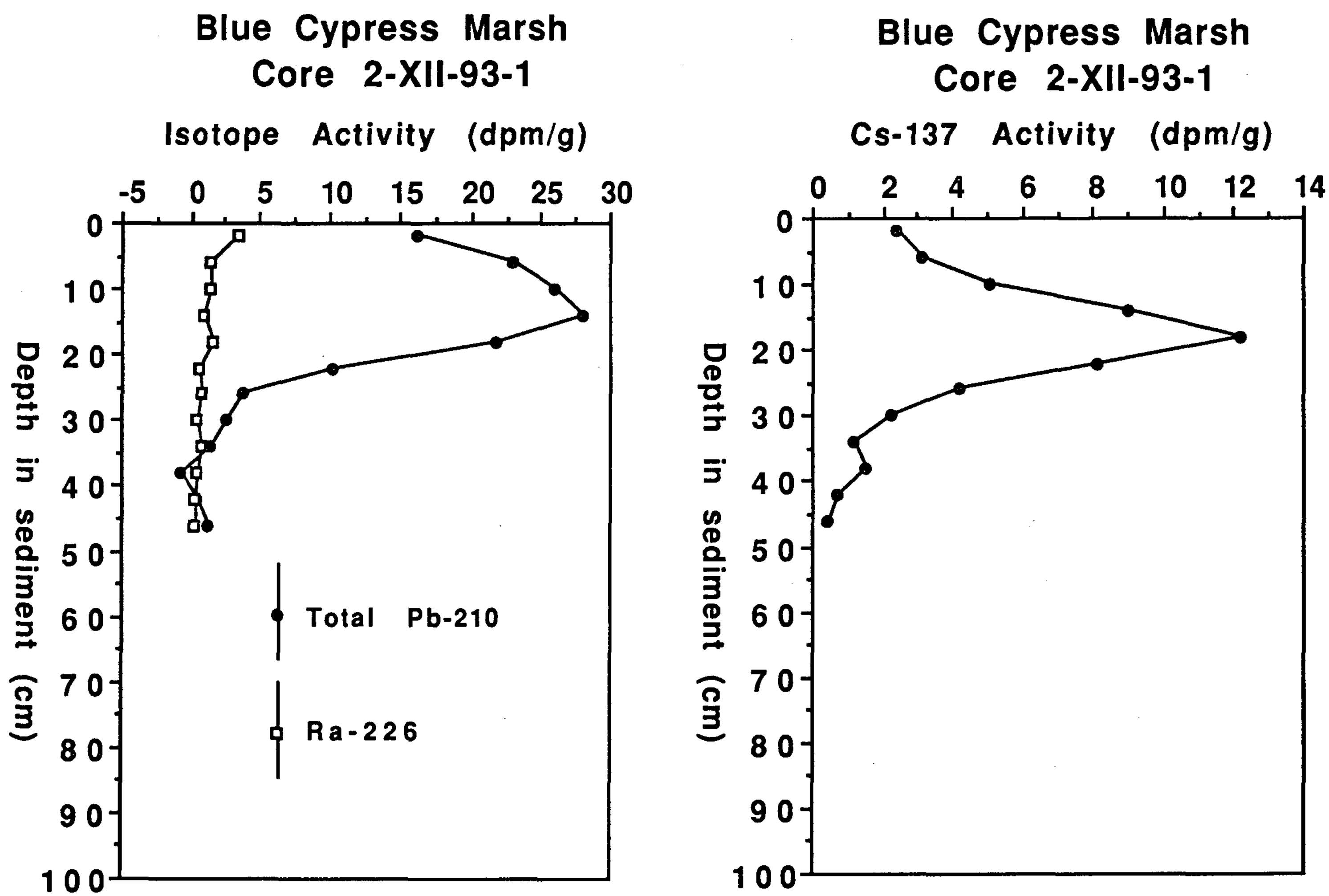


Figure 55. Blue Cypress Marsh Core 2-XII-93-1 total ^{210}Pb & ^{226}Ra activity (dpm g^{-1} dry) and ^{137}Cs activity (dpm g^{-1} dry).

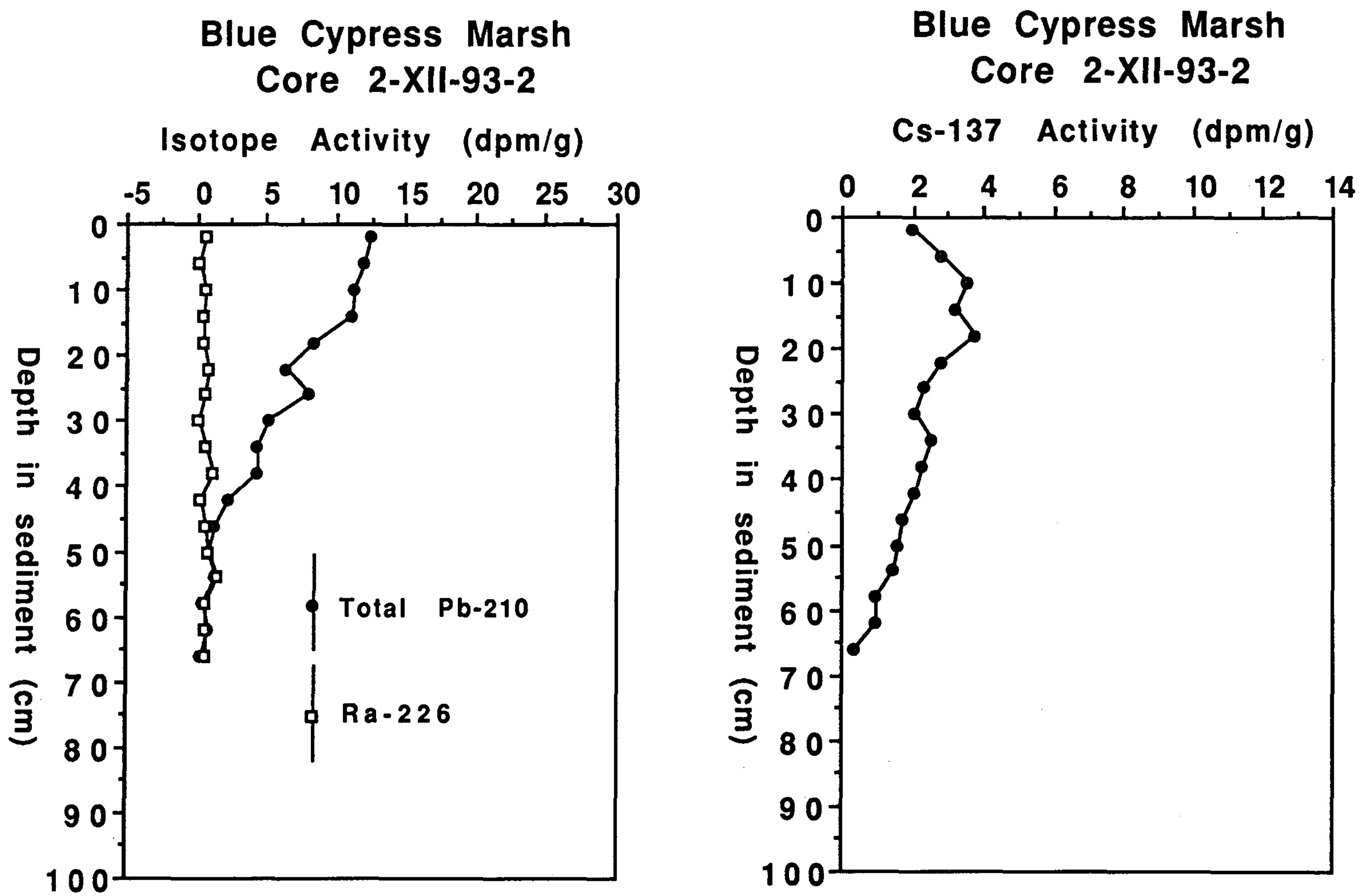


Figure 56. Blue Cypress Marsh Core 2-XII-93-2 total ^{210}Pb & ^{226}Ra activity (dpm g^{-1} dry) and ^{137}Cs activity (dpm g^{-1} dry).

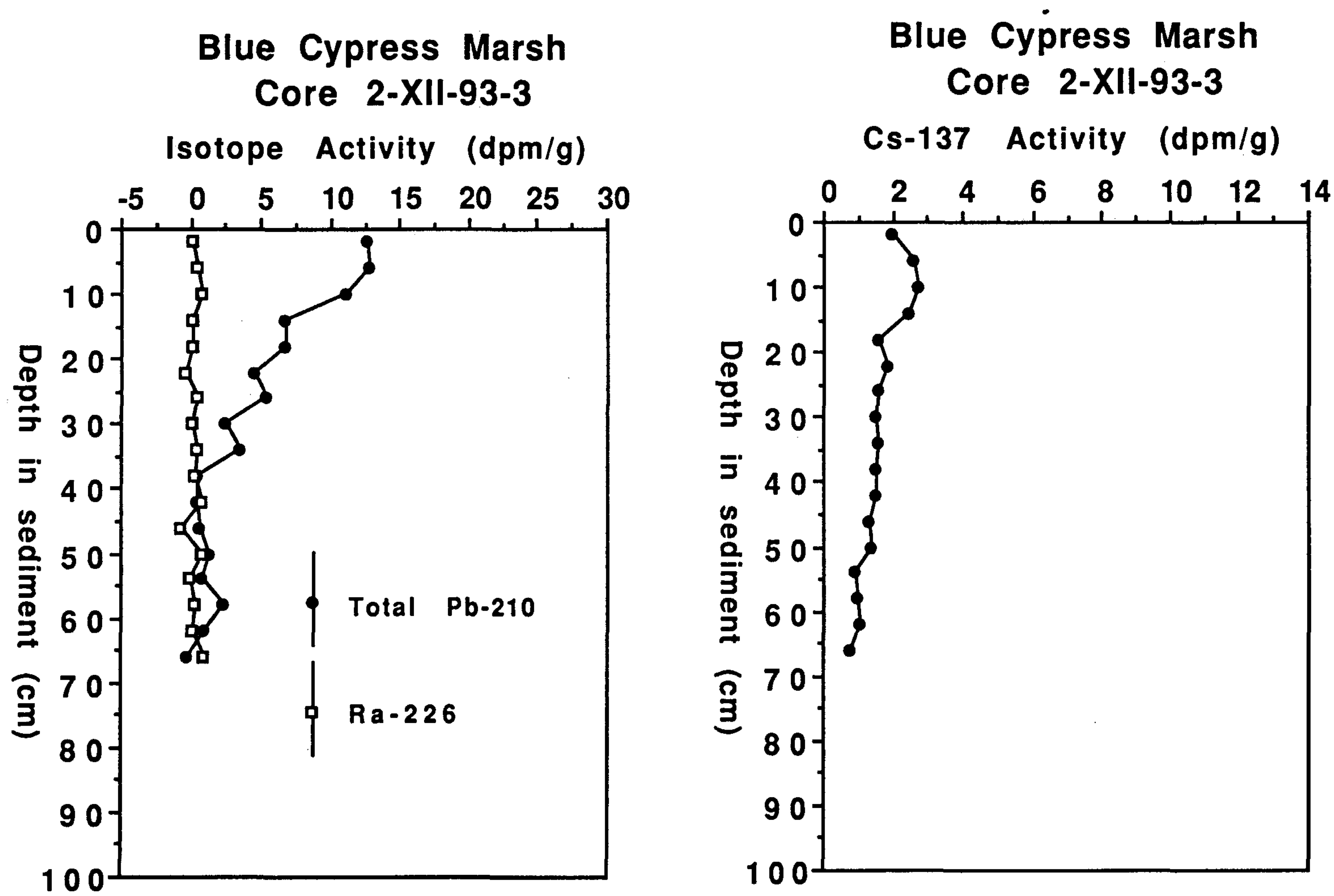


Figure 57. Blue Cypress Marsh Core 2-XII-93-3 total ^{210}Pb & ^{226}Ra activity (dpm g^{-1} dry) and ^{137}Cs activity (dpm g^{-1} dry).

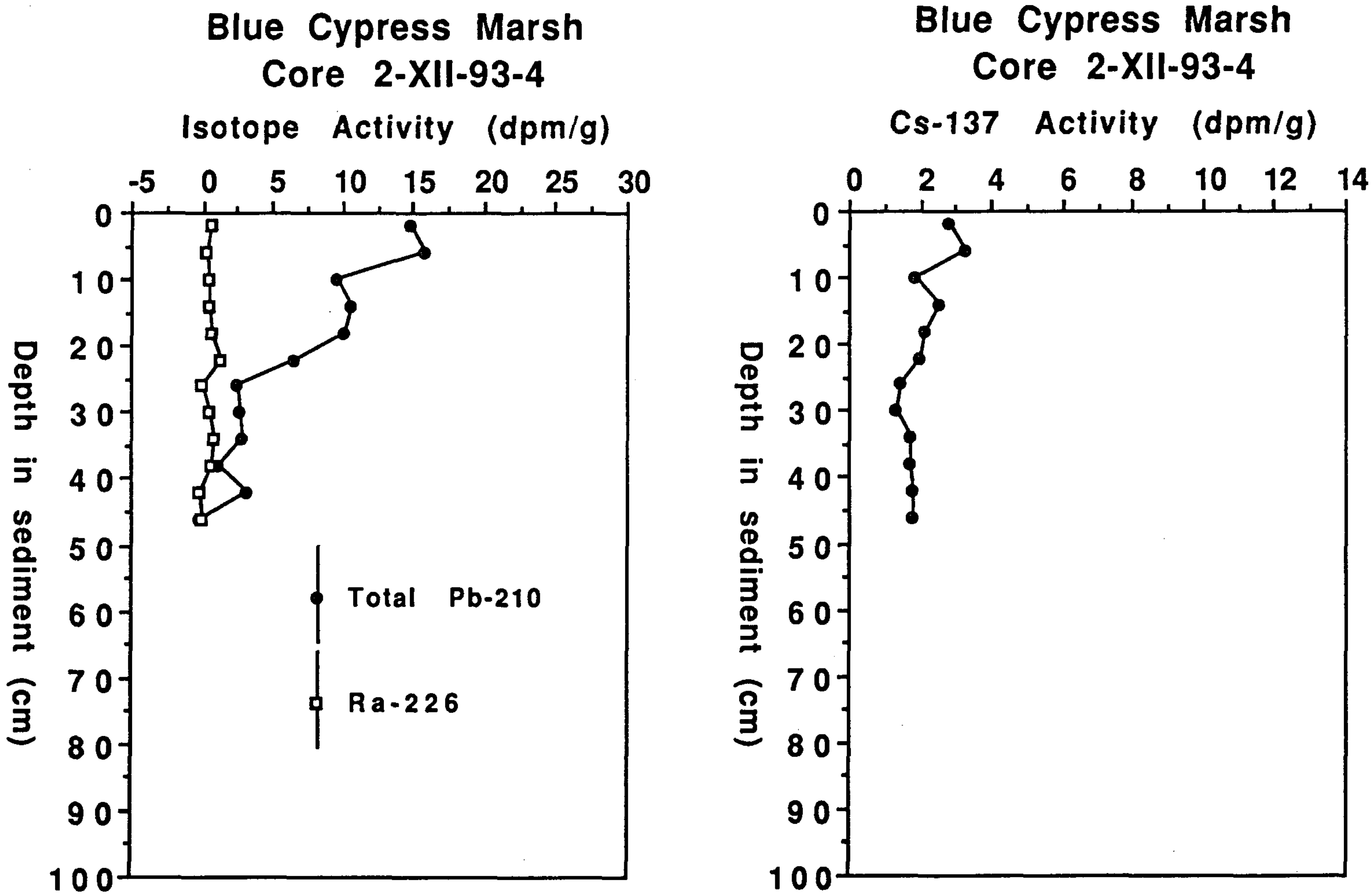
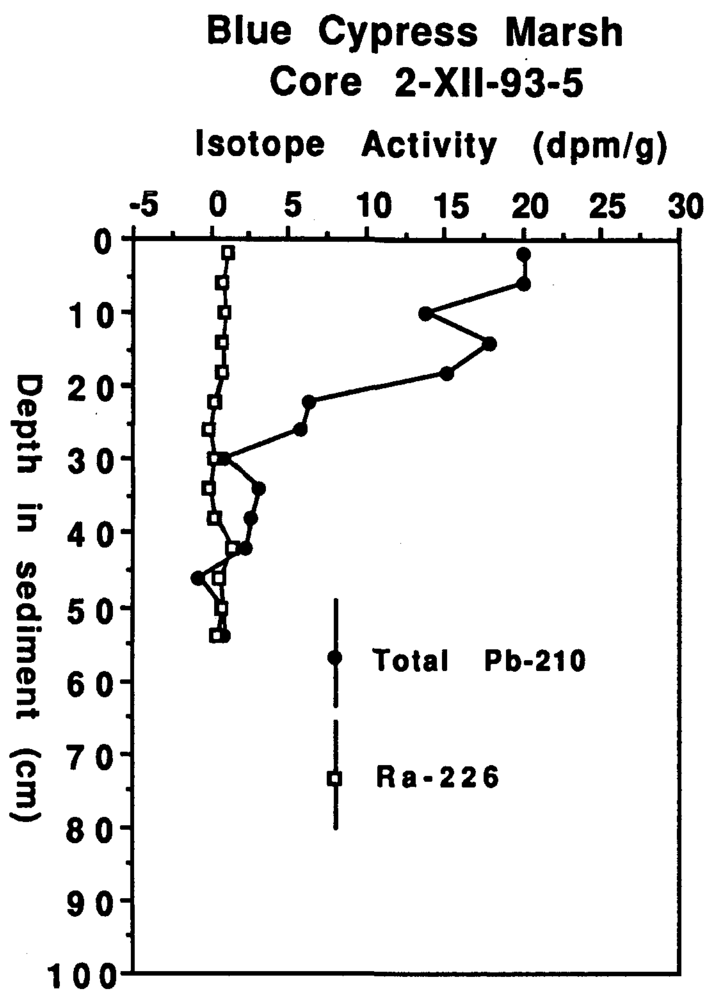


Figure 58. Blue Cypress Marsh Core 2-XII-93-4 total ^{210}Pb & ^{226}Ra activity (dpm g^{-1} dry) and ^{137}Cs activity (dpm g^{-1} dry).



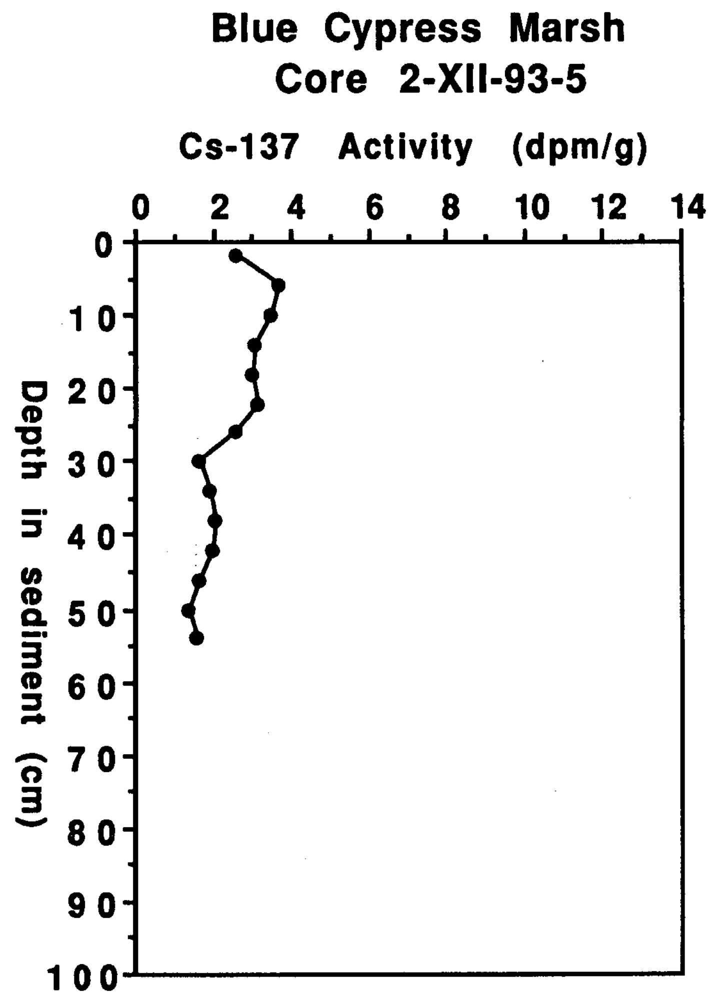


Figure 59. Blue Cypress Marsh Core 2-XII-93-5 total ^{210}Pb & ^{226}Ra activity (dpm g^{-1} dry) and ^{137}Cs activity (dpm g^{-1} dry).

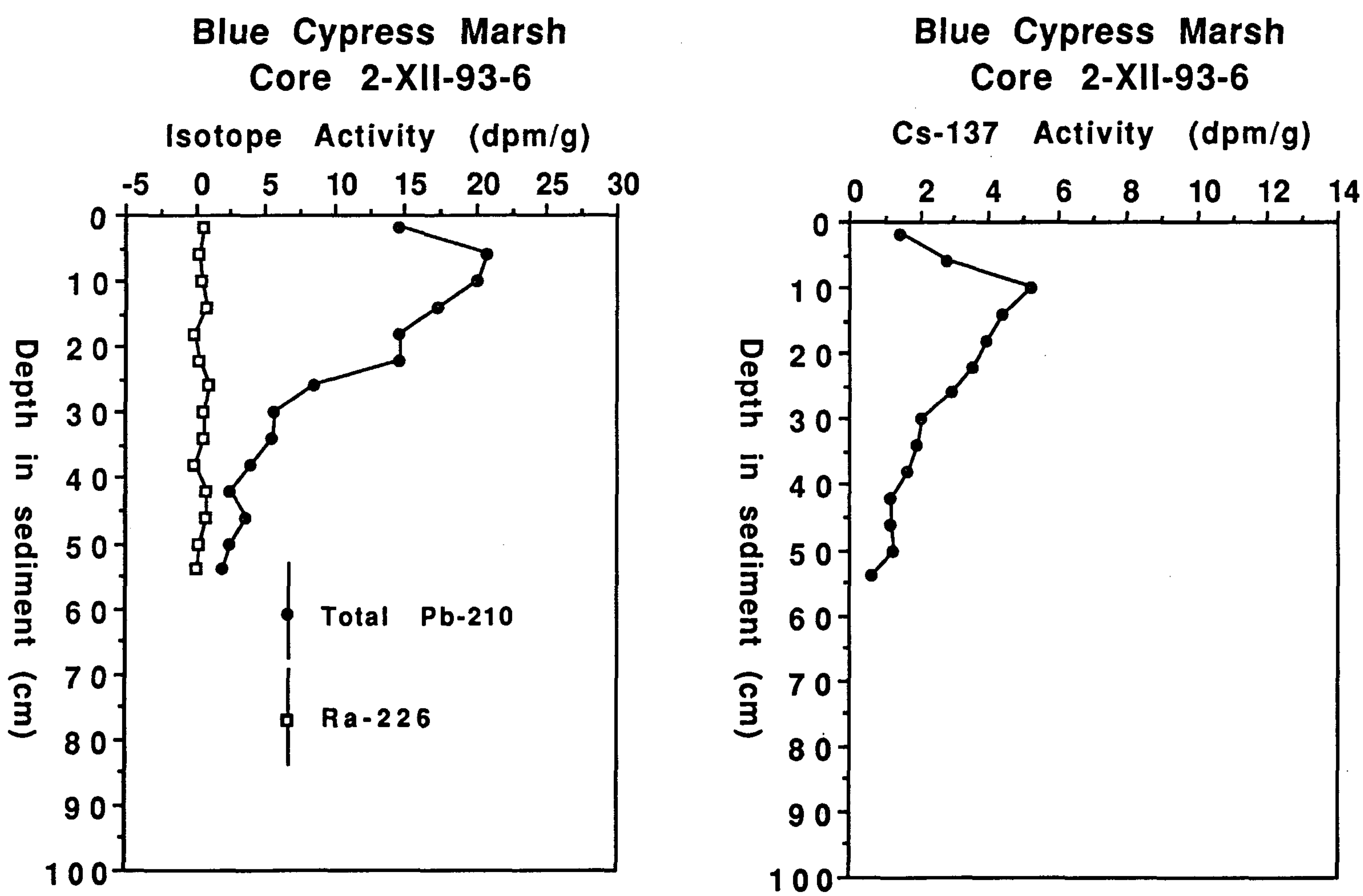
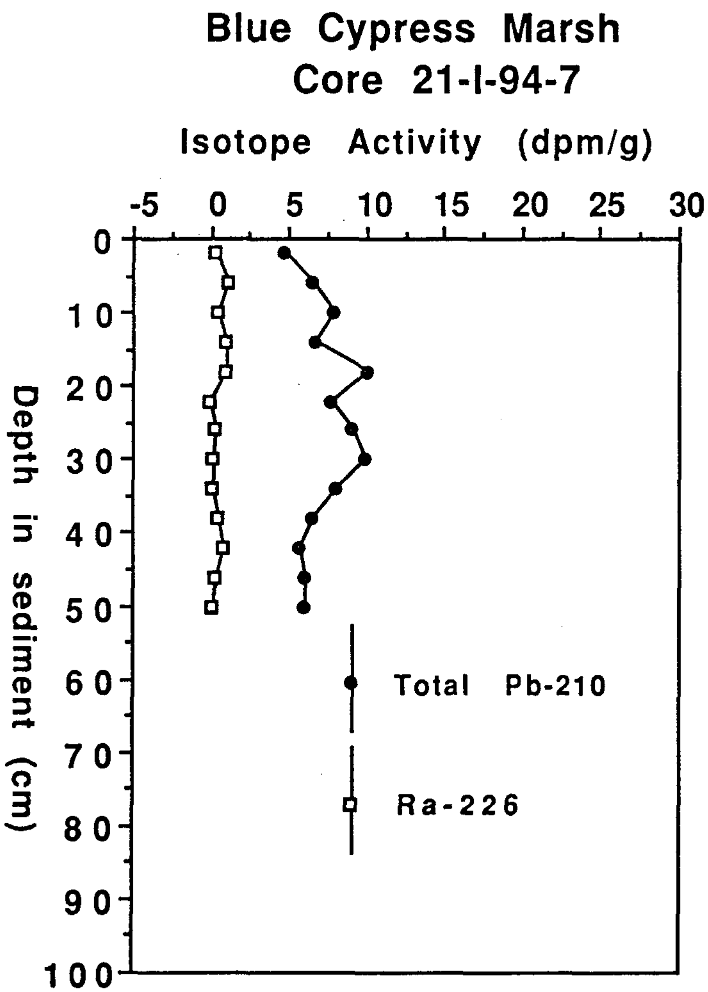


Figure 60. Blue Cypress Marsh Core 2-XII-93-6 total ^{210}Pb & ^{226}Ra activity (dpm g^{-1} dry) and ^{137}Cs activity (dpm g^{-1} dry).



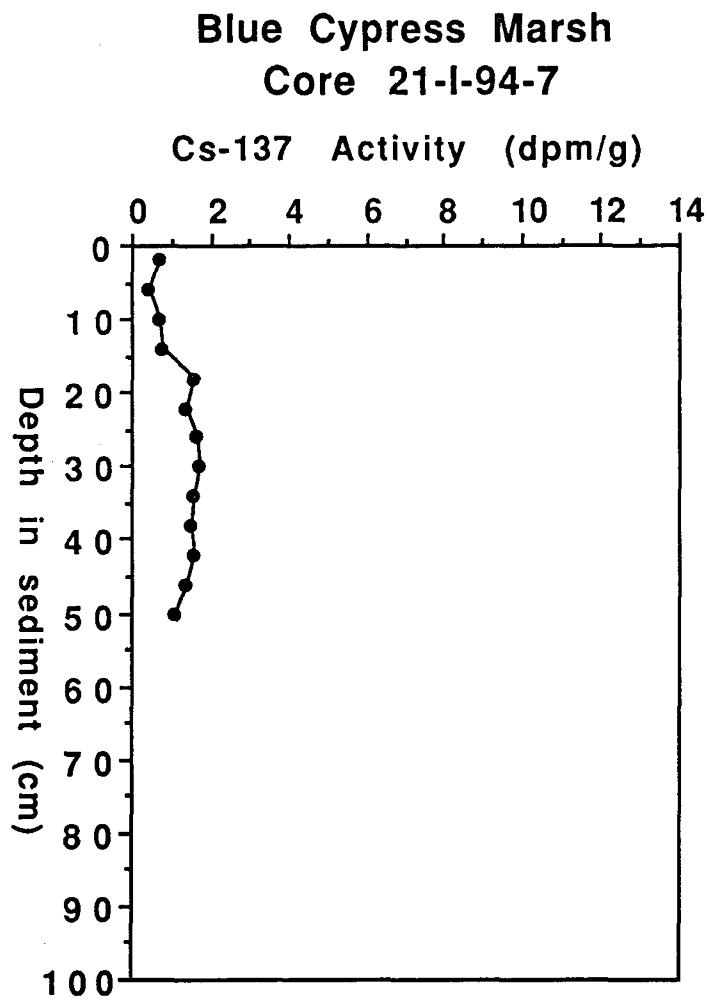


Figure 61. Blue Cypress Marsh Core 21-I-94-7 total ^{210}Pb & ^{226}Ra activity (dpm g^{-1} dry) and ^{137}Cs activity (dpm g^{-1} dry).

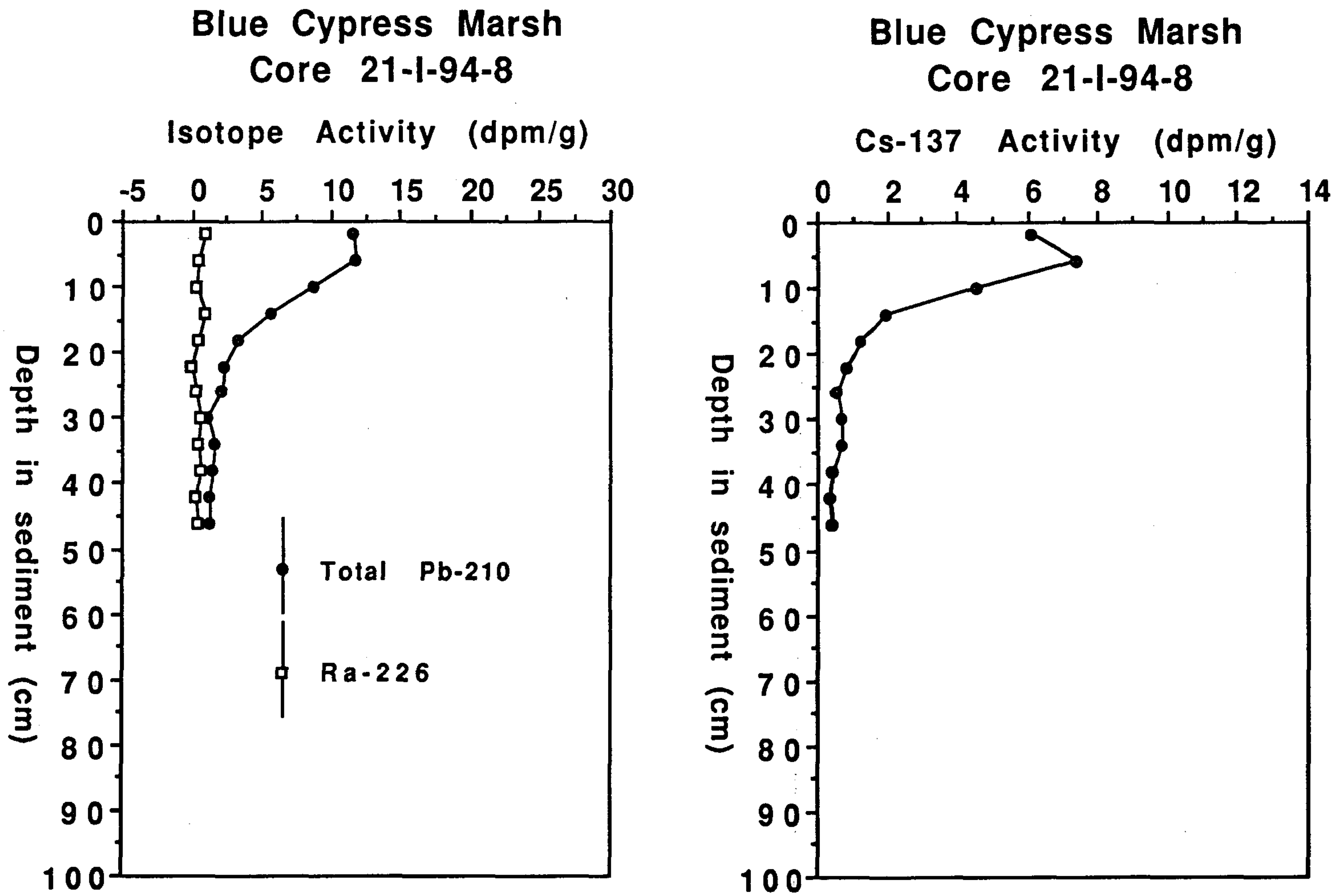


Figure 62. Blue Cypress Marsh Core 21-I-94-8 total ^{210}Pb & ^{226}Ra activity (dpm g^{-1} dry) and ^{137}Cs activity (dpm g^{-1} dry).

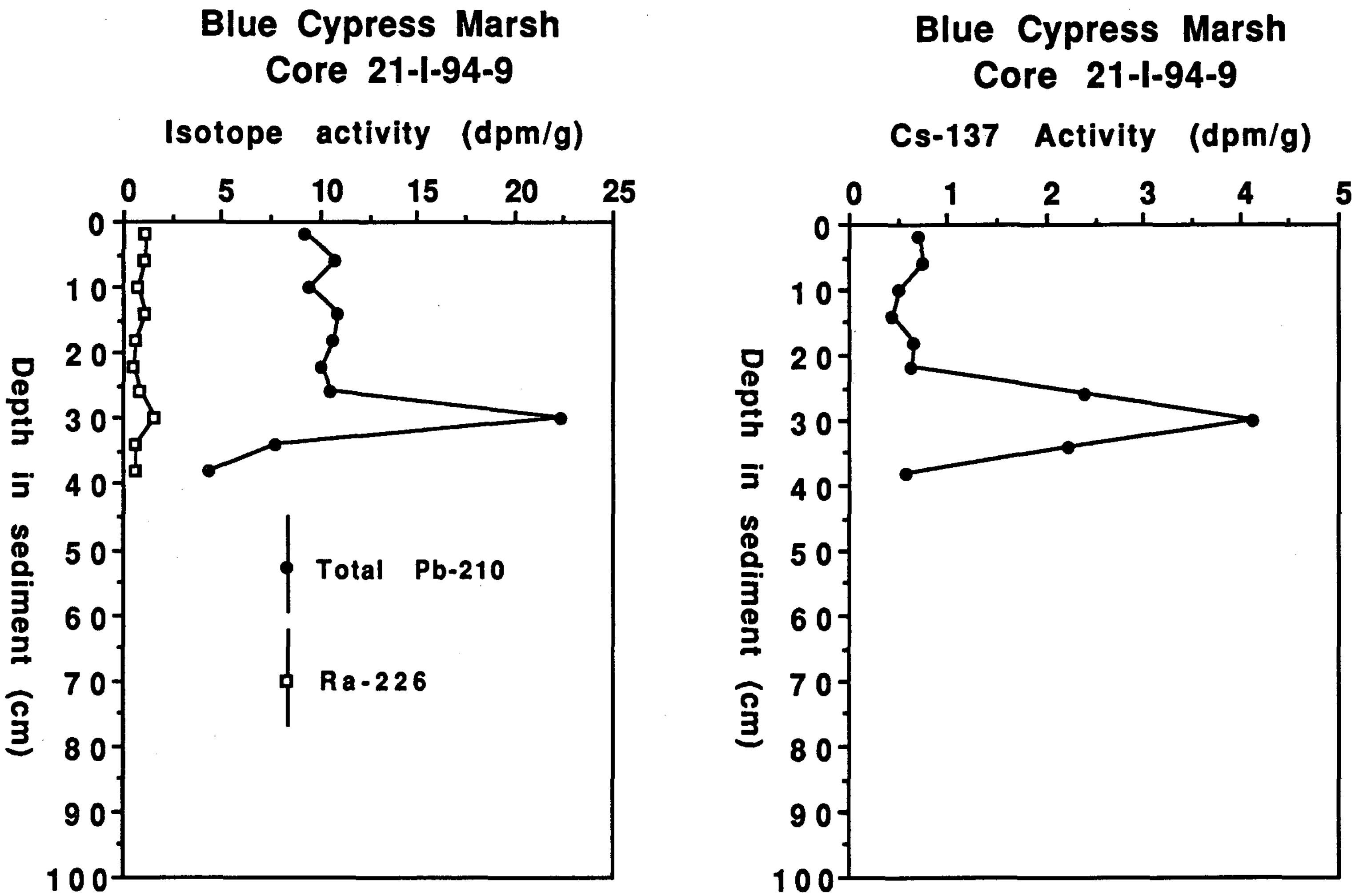


Figure 63. Blue Cypress Marsh Core 21-I-94-9 total ^{210}Pb & ^{226}Ra activity (dpm g^{-1} dry) and ^{137}Cs activity (dpm g^{-1} dry).

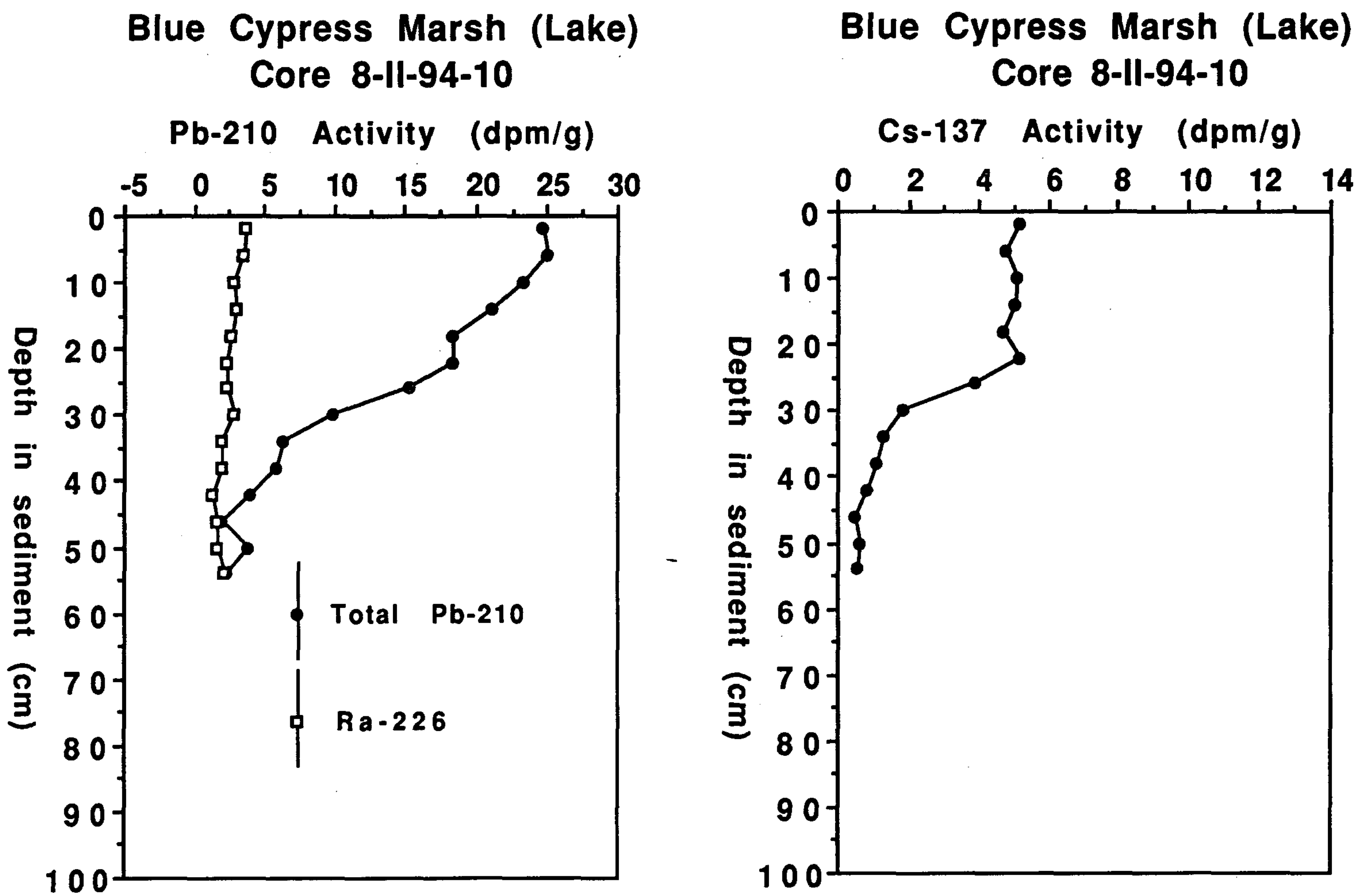


Figure 64. Blue Cypress Marsh Core 8-II-94-10 total ^{210}Pb & ^{226}Ra activity (dpm g^{-1} dry) and ^{137}Cs activity (dpm g^{-1} dry).

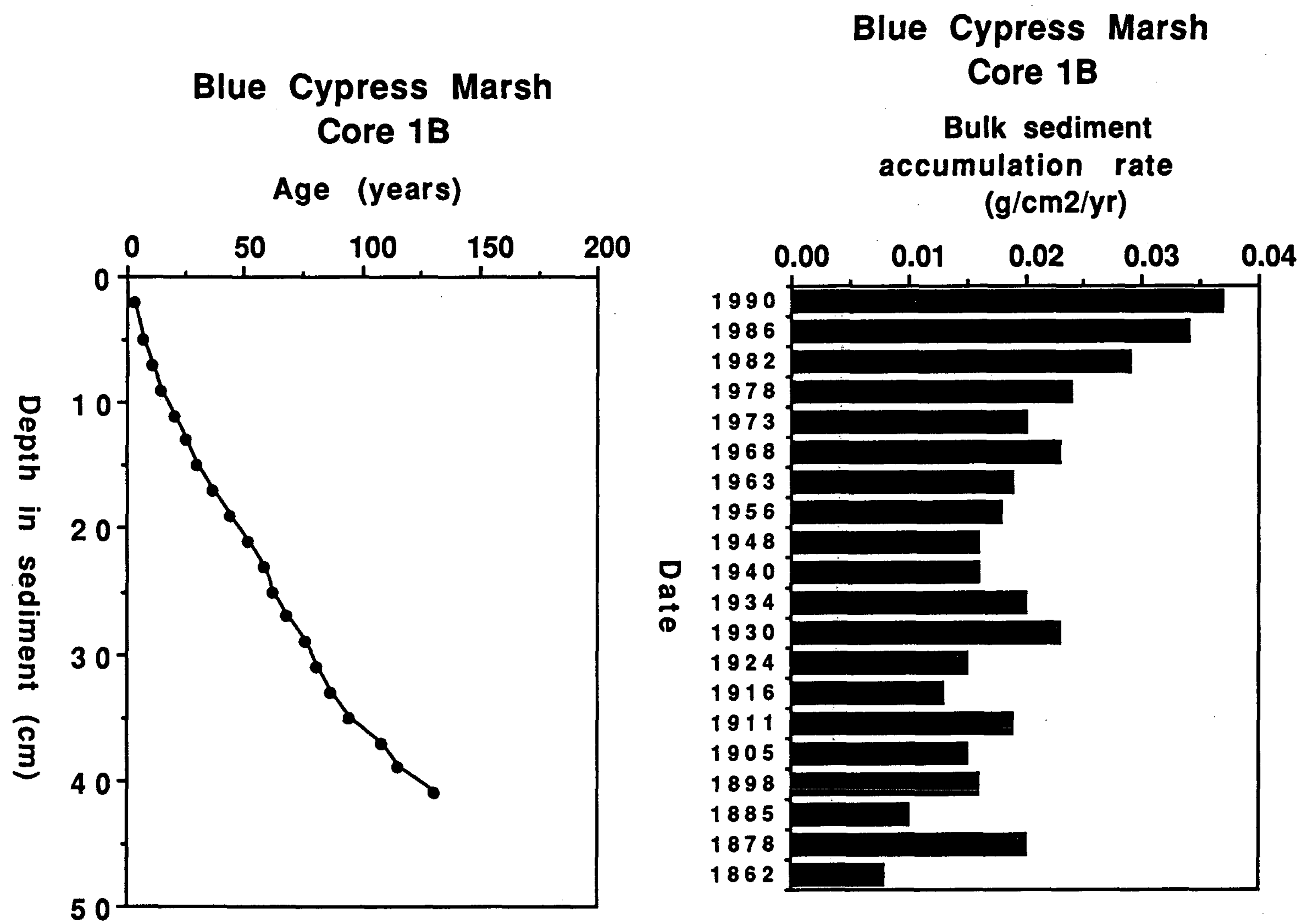


Figure 65. Blue Cypress Marsh Core 1B age/depth curve and bulk sediment accumulation rate (g cm^{-2} yr^{-1}).

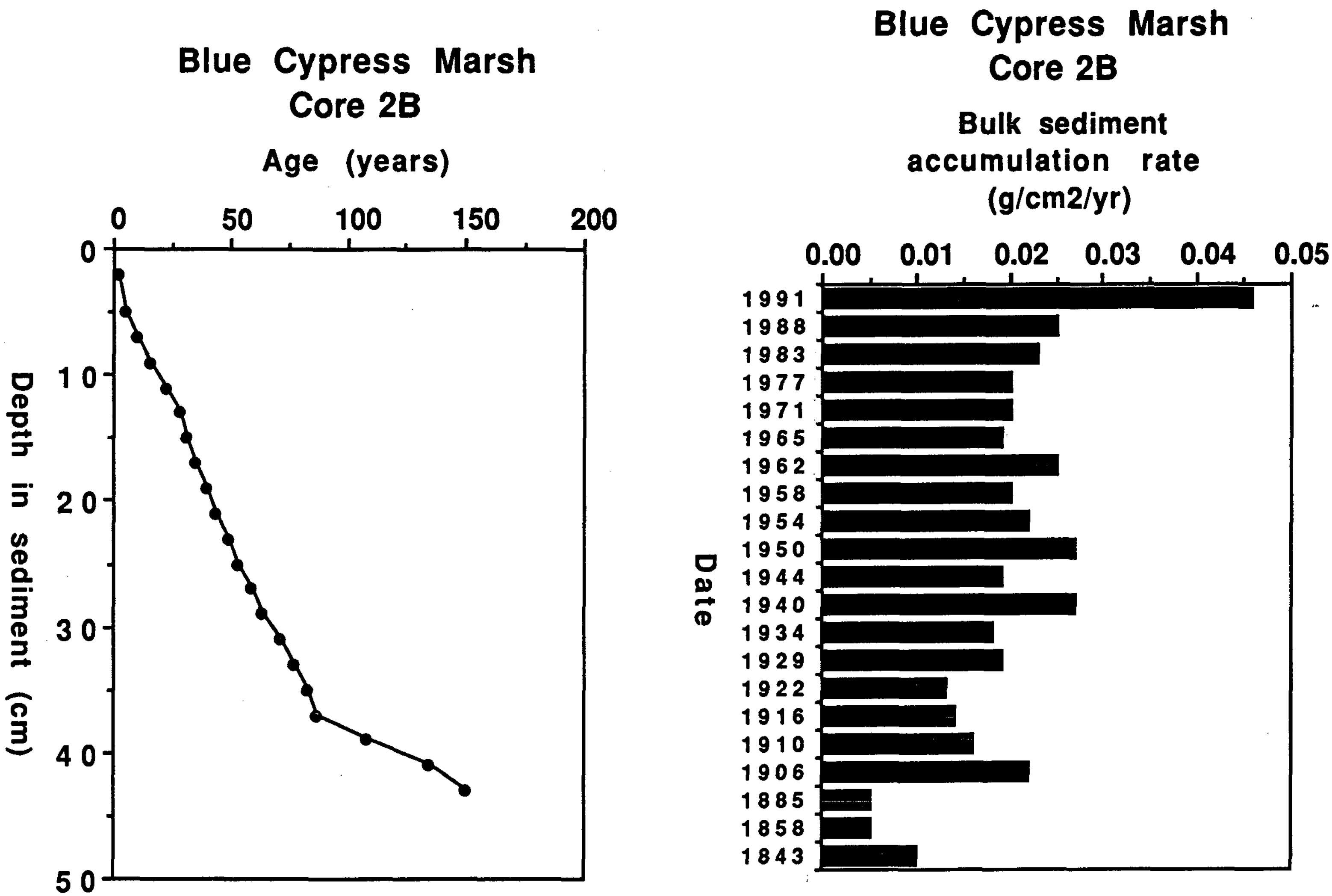
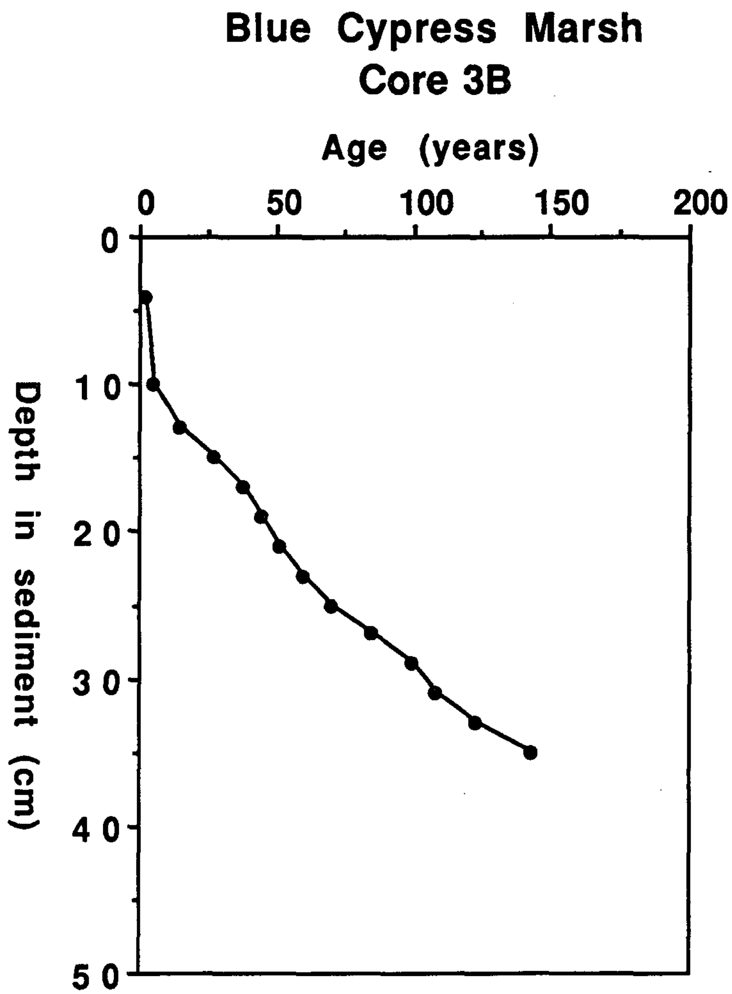


Figure 66. Blue Cypress Marsh Core 2B age/depth curve and bulk sediment accumulation rate (g cm^{-2} yr^{-1}).



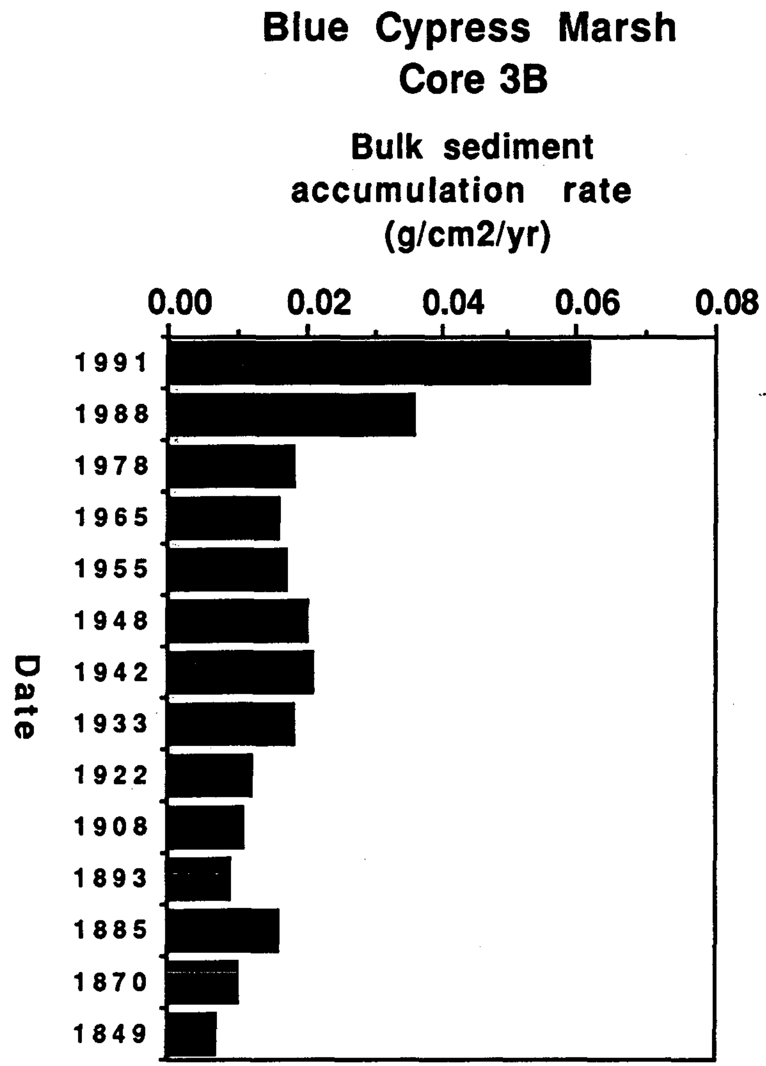


Figure 67. Blue Cypress Marsh Core 3B age/depth curve and bulk sediment accumulation rate (g cm^{-2} yr^{-1}).

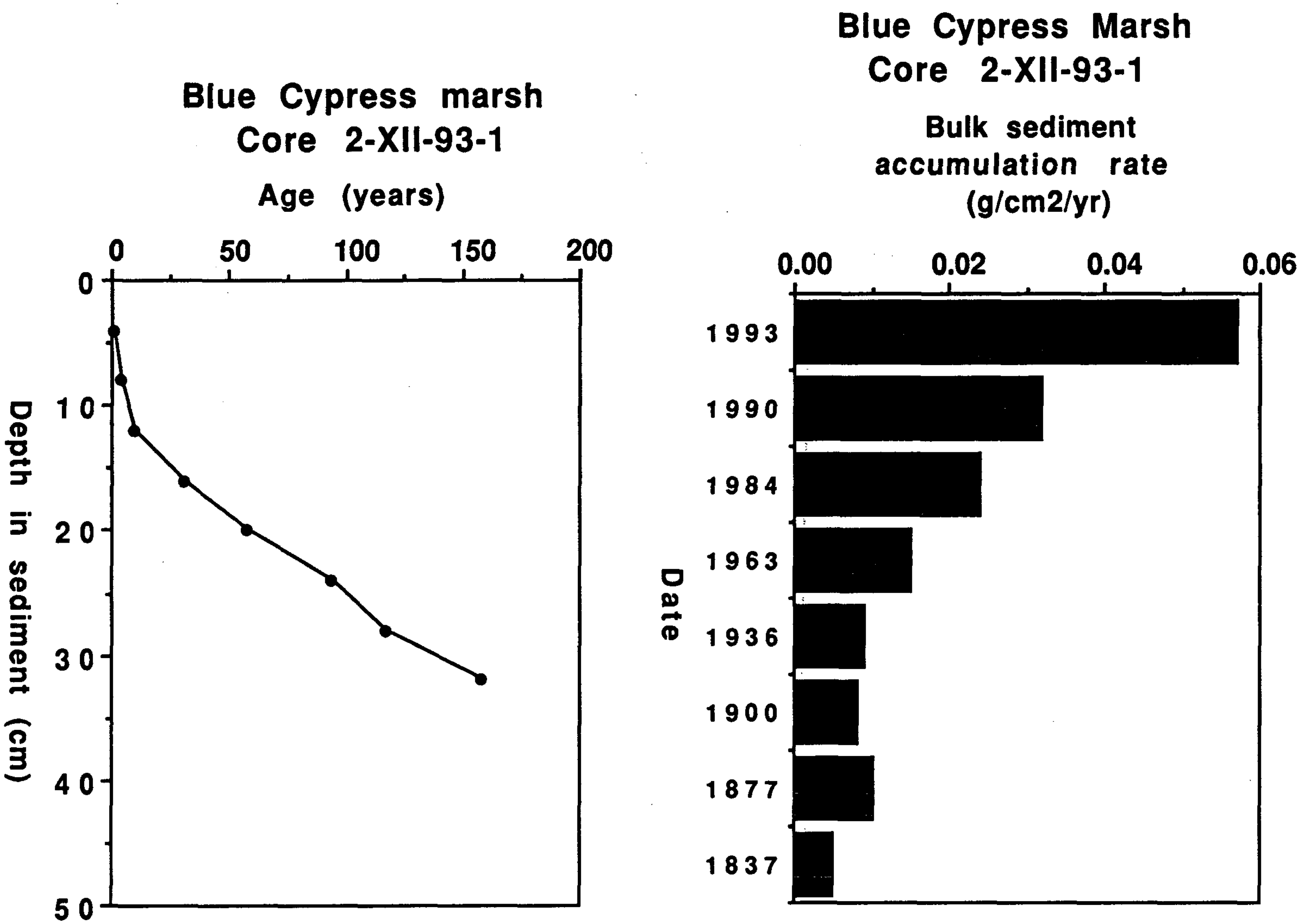


Figure 68. Blue Cypress Marsh Core 2-XII-93-1 age/depth curve and bulk sediment accumulation rate (g cm^{-2} yr^{-1}).

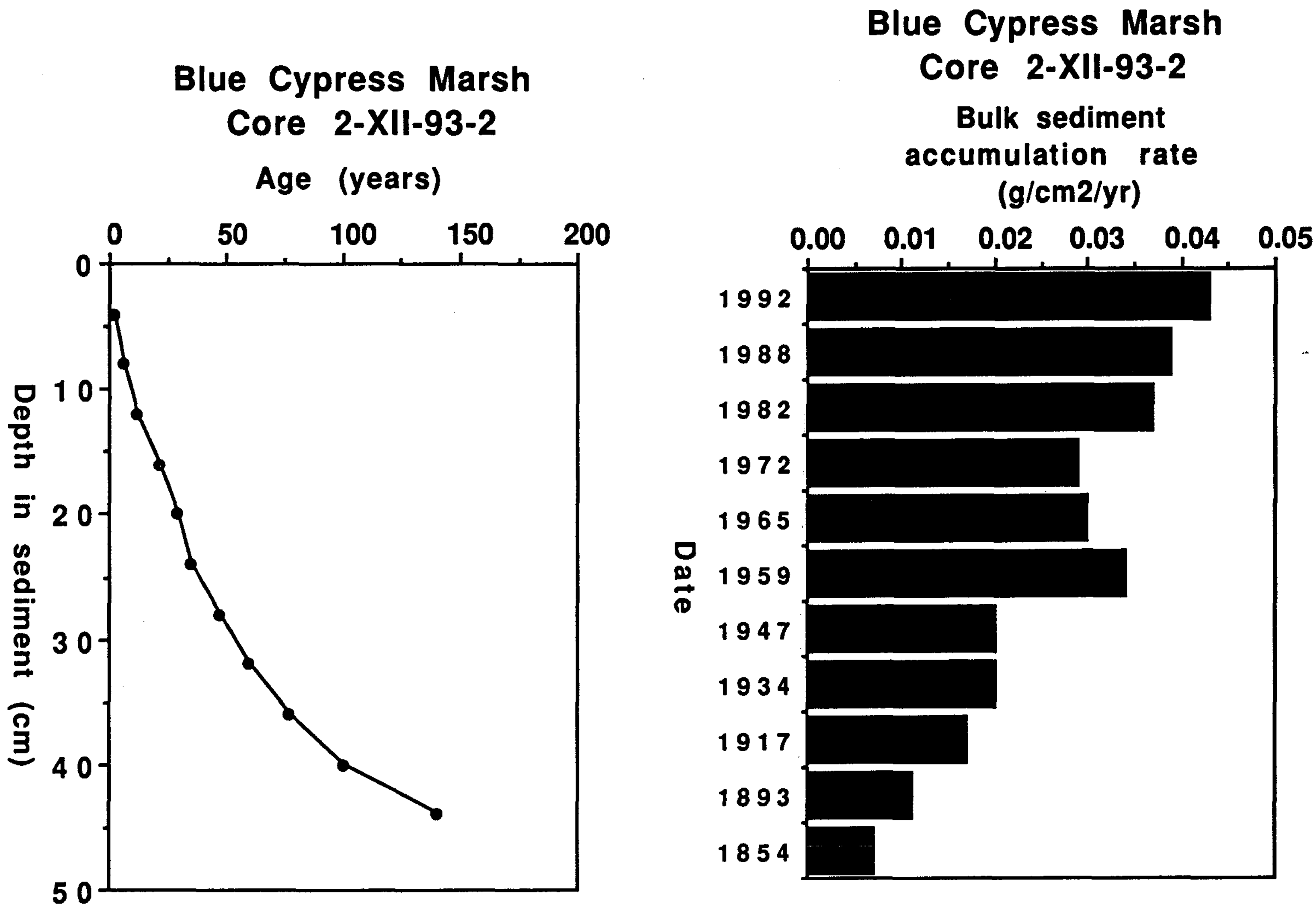


Figure 69. Blue Cypress Marsh Core 2-XII-93-2 age/depth curve and bulk sediment accumulation rate (g cm^{-2} yr^{-1}).

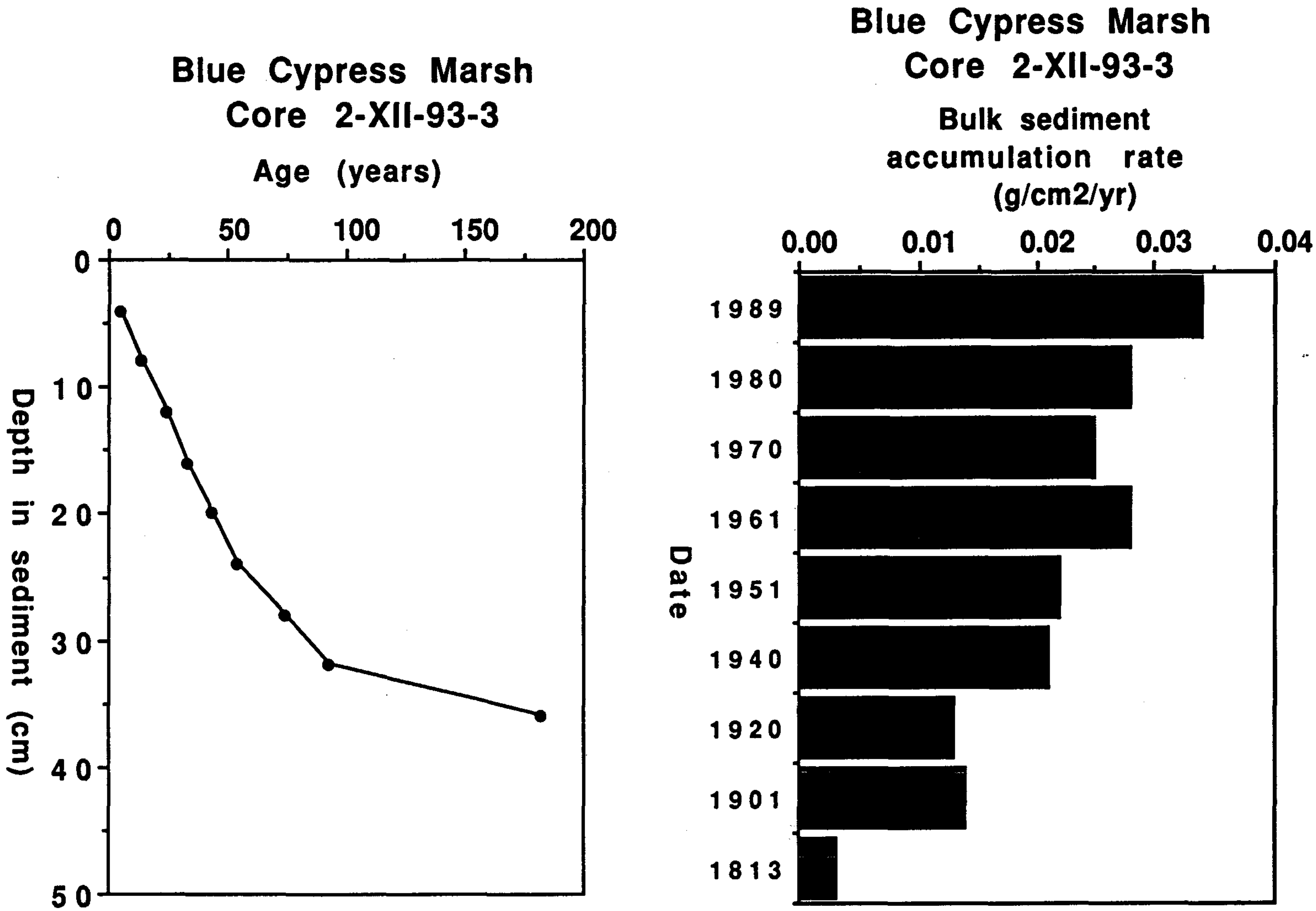


Figure 70. Blue Cypress Marsh Core 2-XII-93-3 age/depth curve and bulk sediment accumulation rate (g cm^{-2} yr^{-1}).

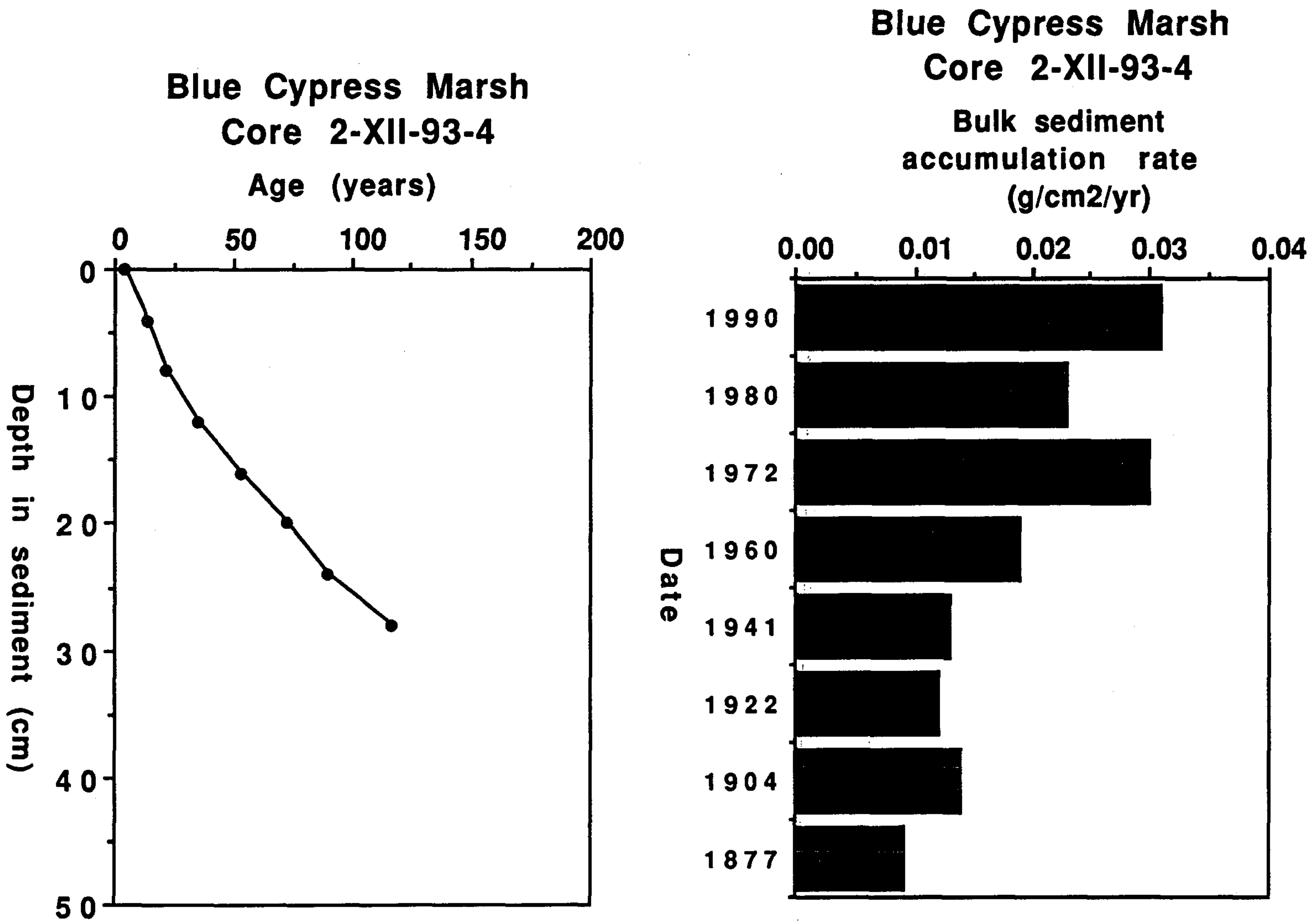


Figure 71. Blue Cypress Marsh Core 2-XII-93-4 age/depth curve
and bulk sediment accumulation rate (g cm^{-2} yr^{-1}).

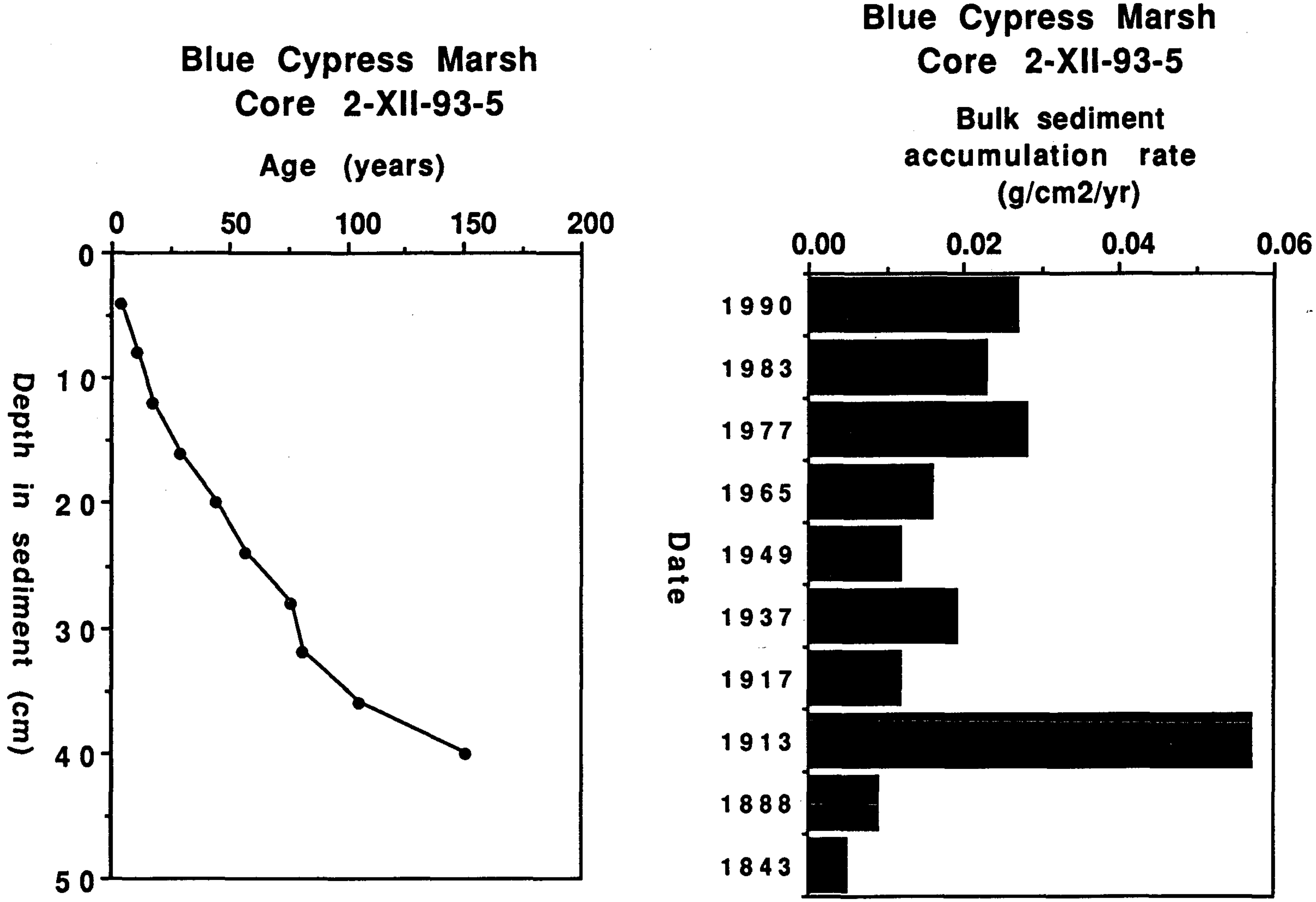


Figure 72. Blue Cypress Marsh Core 2-XII-93-5 age/depth curve
and bulk sediment accumulation rate (g cm^{-2} yr^{-1}).

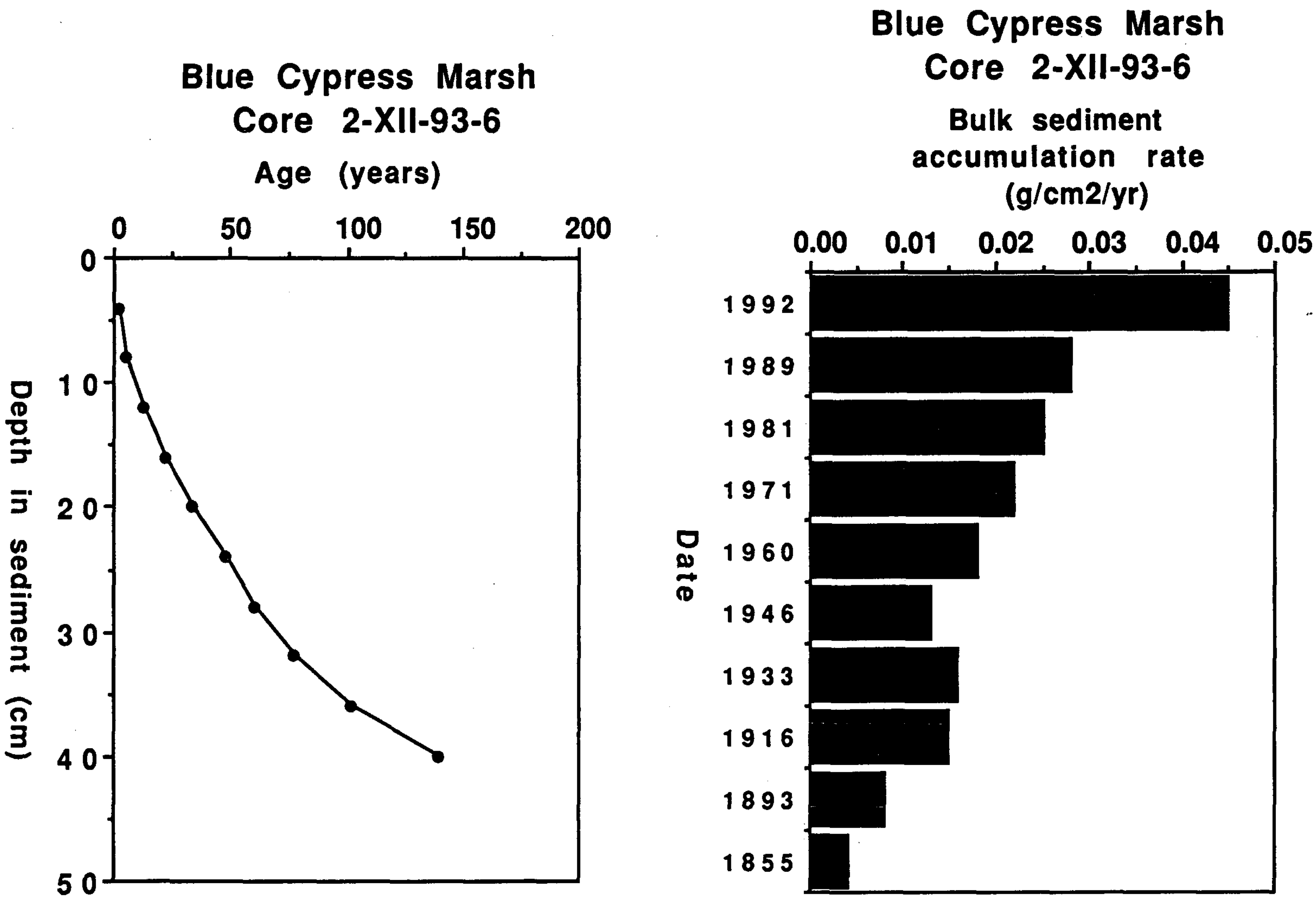


Figure 73. Blue Cypress Marsh Core 2-XII-93-6 age/depth curve and bulk sediment accumulation rate (g cm^{-2} yr^{-1}).

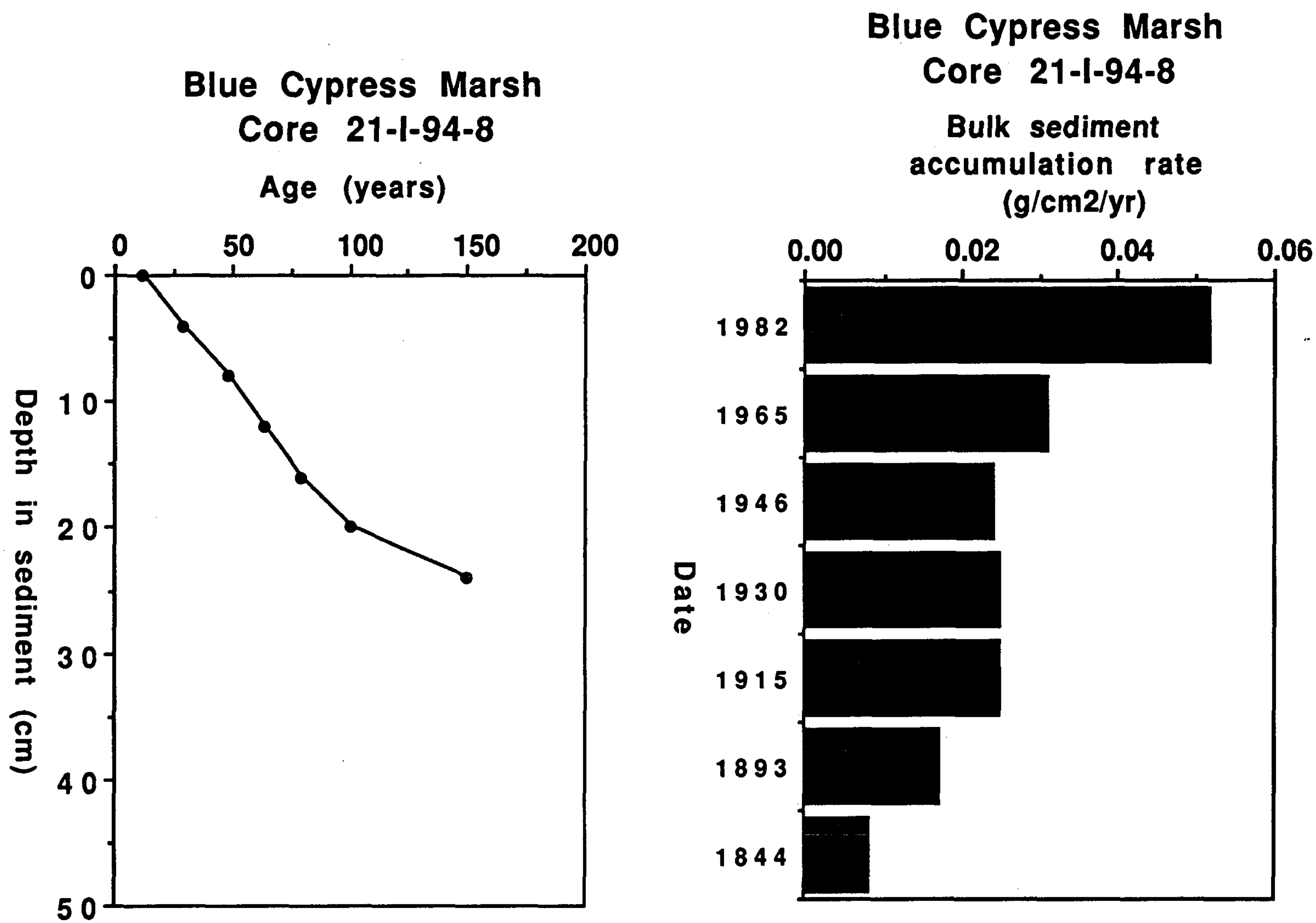


Figure 74. Blue Cypress Marsh Core 21-I-94-8 age/depth curve and bulk sediment accumulation rate (g cm^{-2} yr^{-1}).

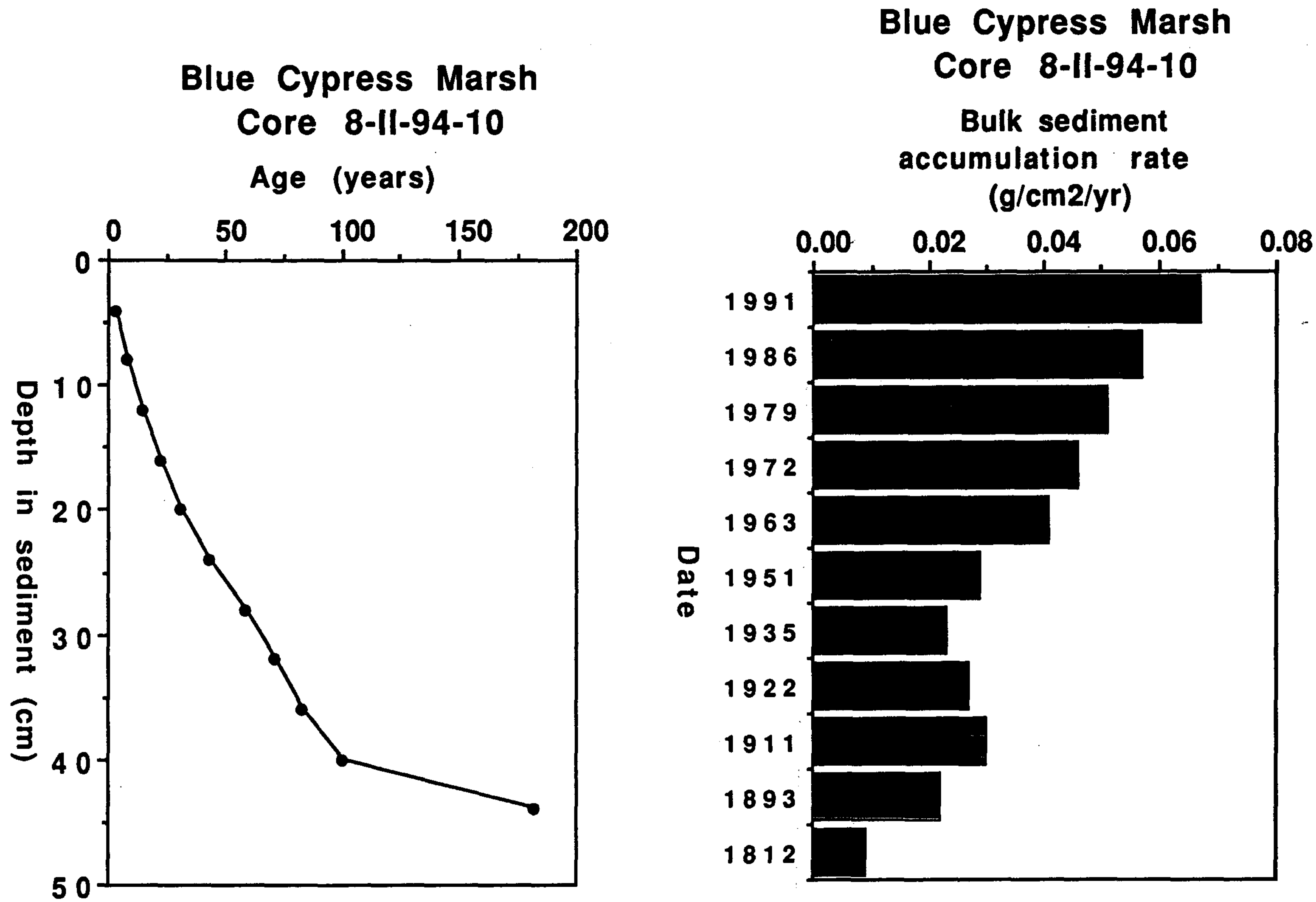


Figure 75. Blue Cypress Marsh Core 8-II-94-10 age/depth curve and bulk sediment accumulation rate (g cm^{-2} yr^{-1}).

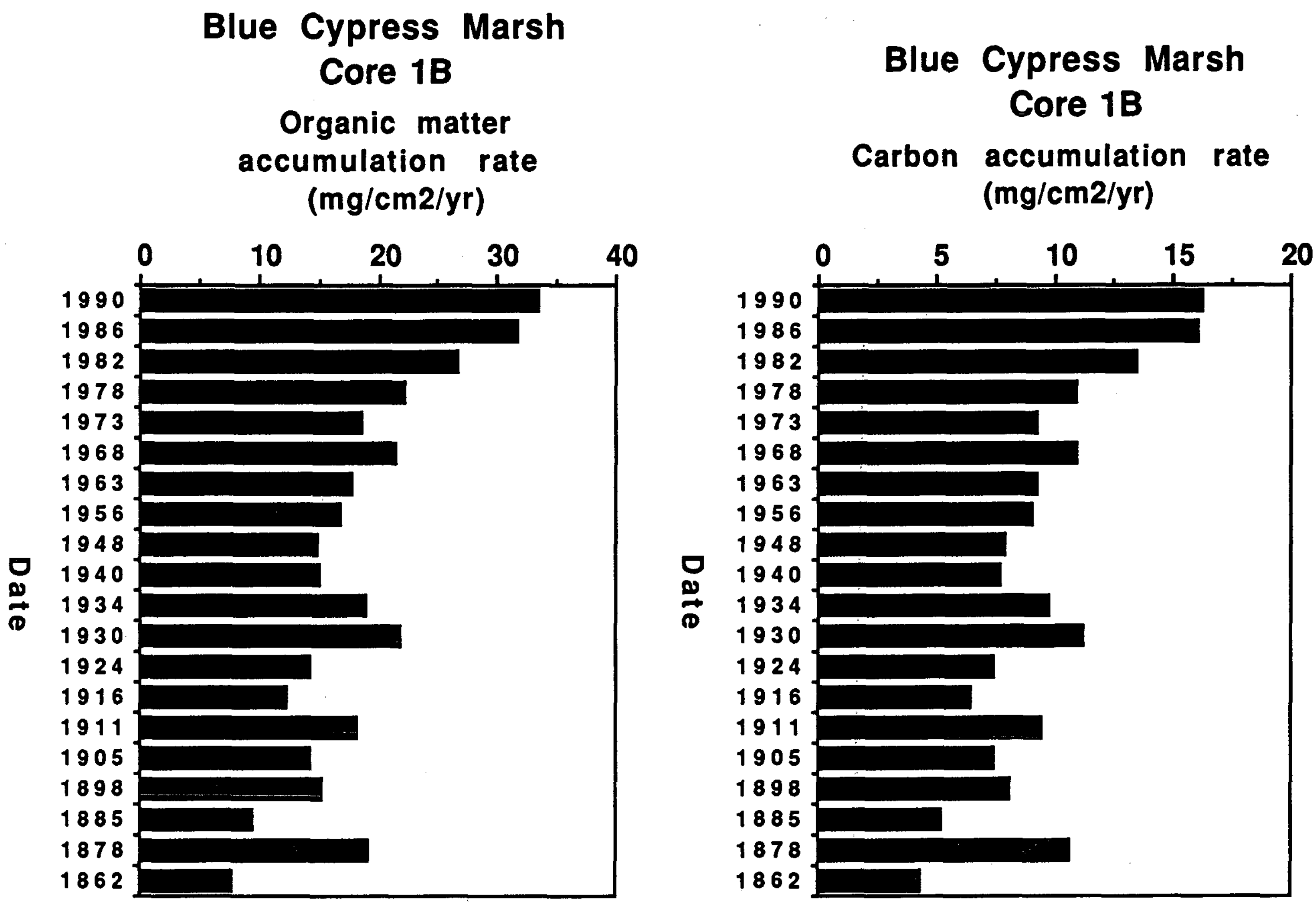
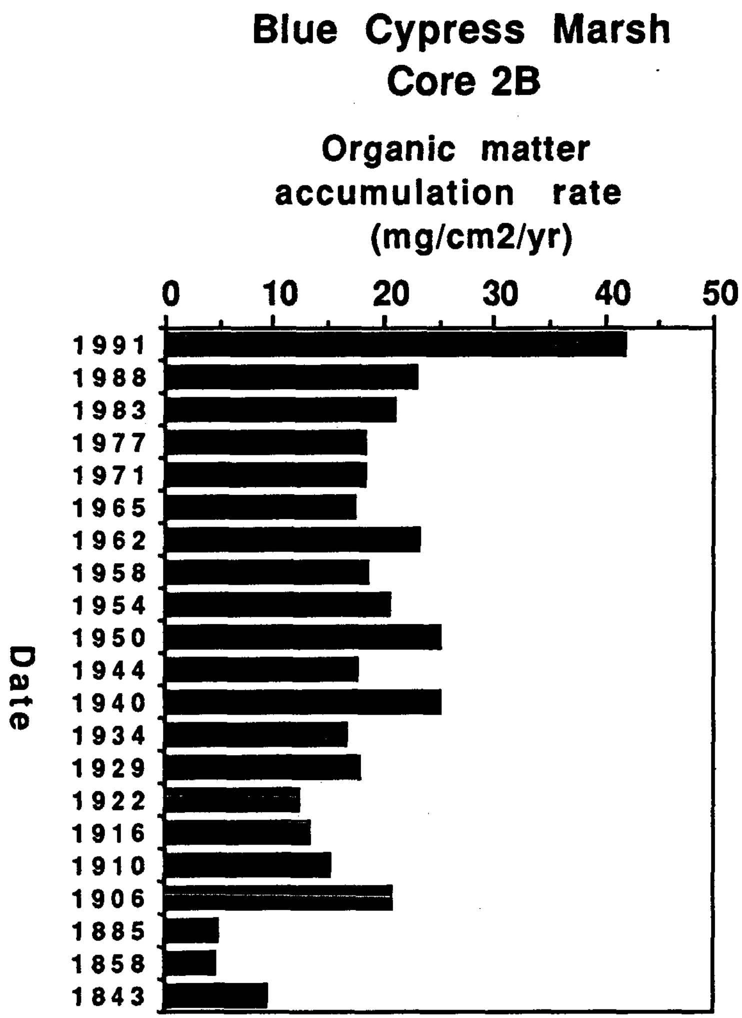


Figure 76. Blue Cypress Marsh Core 1B organic matter accumulation rate (mg cm^{-2} yr^{-1}) and carbon accumulation rate (mg cm^{-2} yr^{-1}).



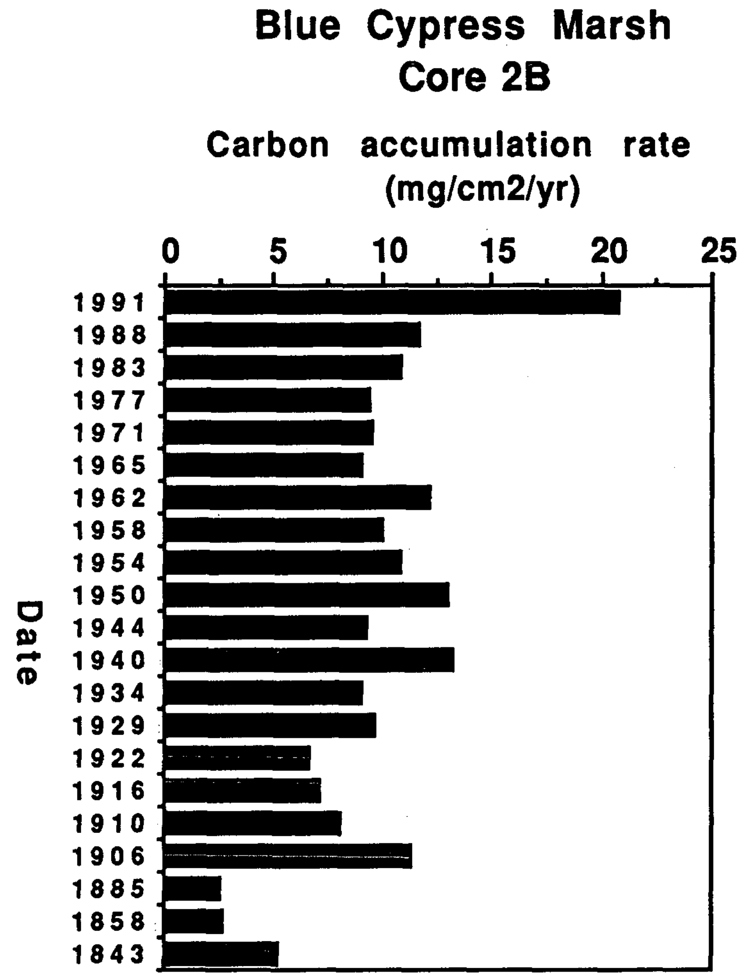


Figure 77. Blue Cypress Marsh Core 2B organic matter accumulation rate (mg cm^{-2} yr^{-1}) and carbon accumulation rate (mg cm^{-2} yr^{-1}).

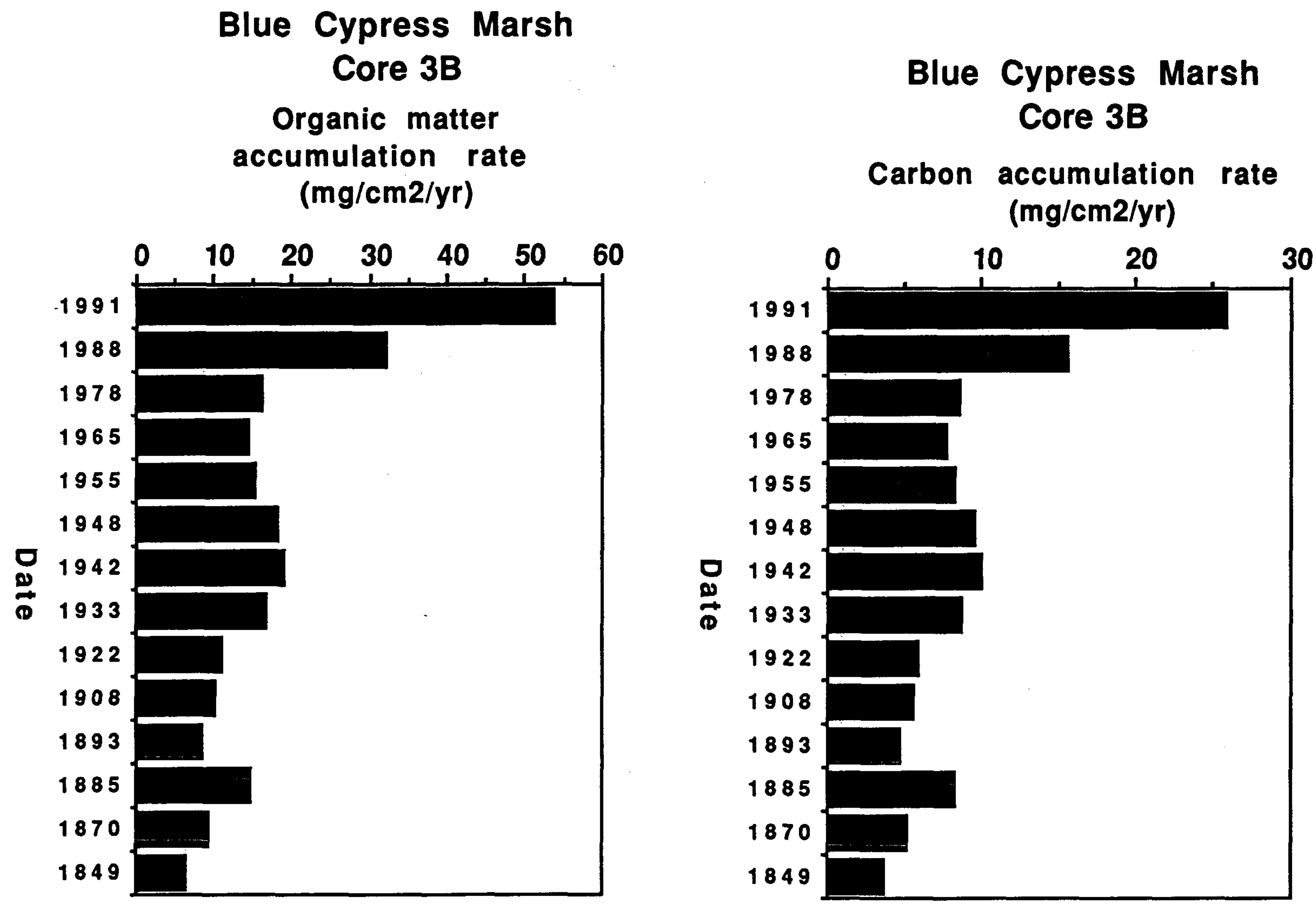


Figure 78. Blue Cypress Marsh Core 3B organic matter accumulation rate (mg cm^{-2} yr^{-1}) and carbon accumulation rate (mg cm^{-2} yr^{-1}).

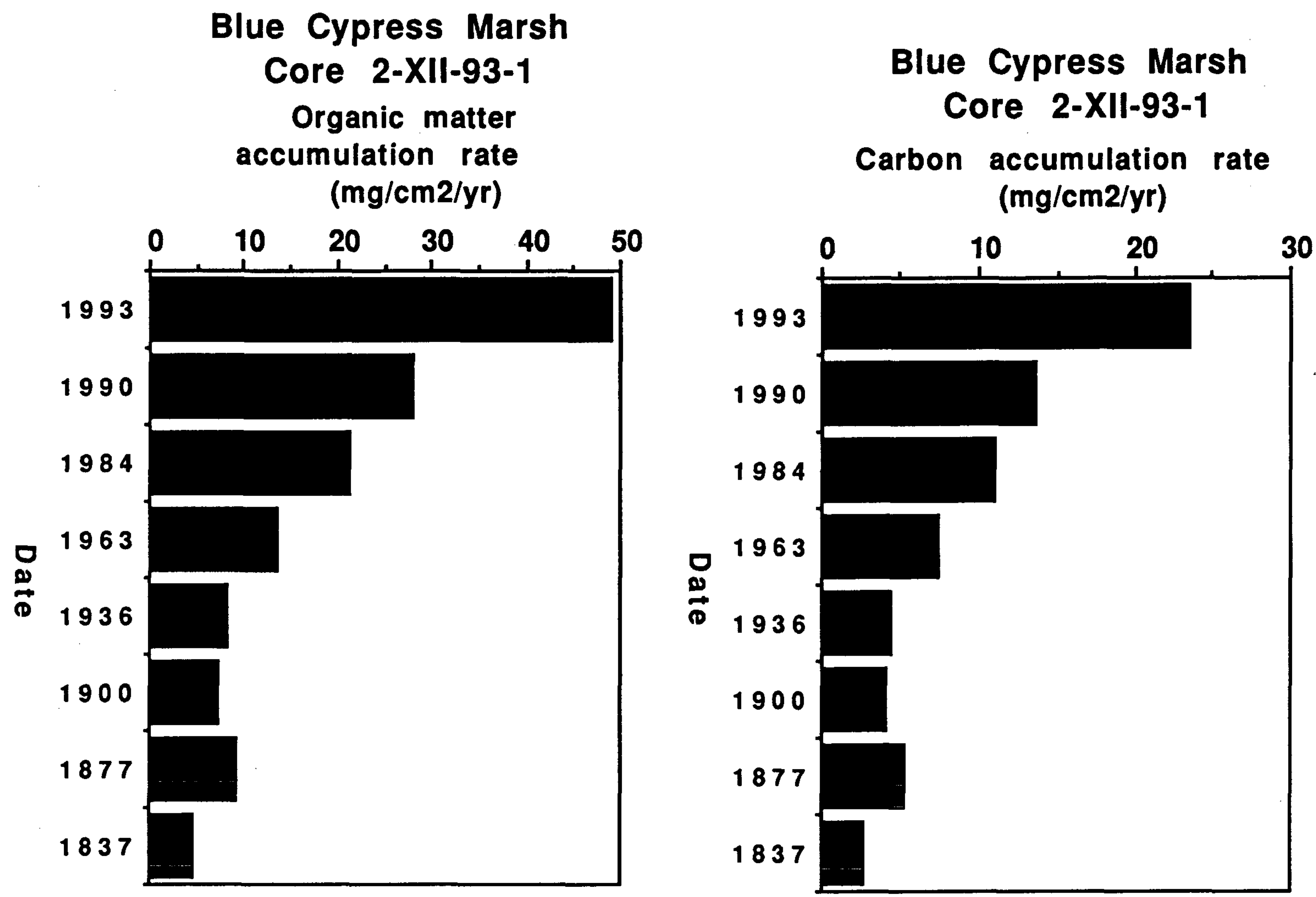


Figure 79. Blue Cypress Marsh Core 2-XII-93-1 organic matter accumulation rate (mg cm^{-2} yr^{-1}) and carbon accumulation rate (mg cm^{-2} yr^{-1}).

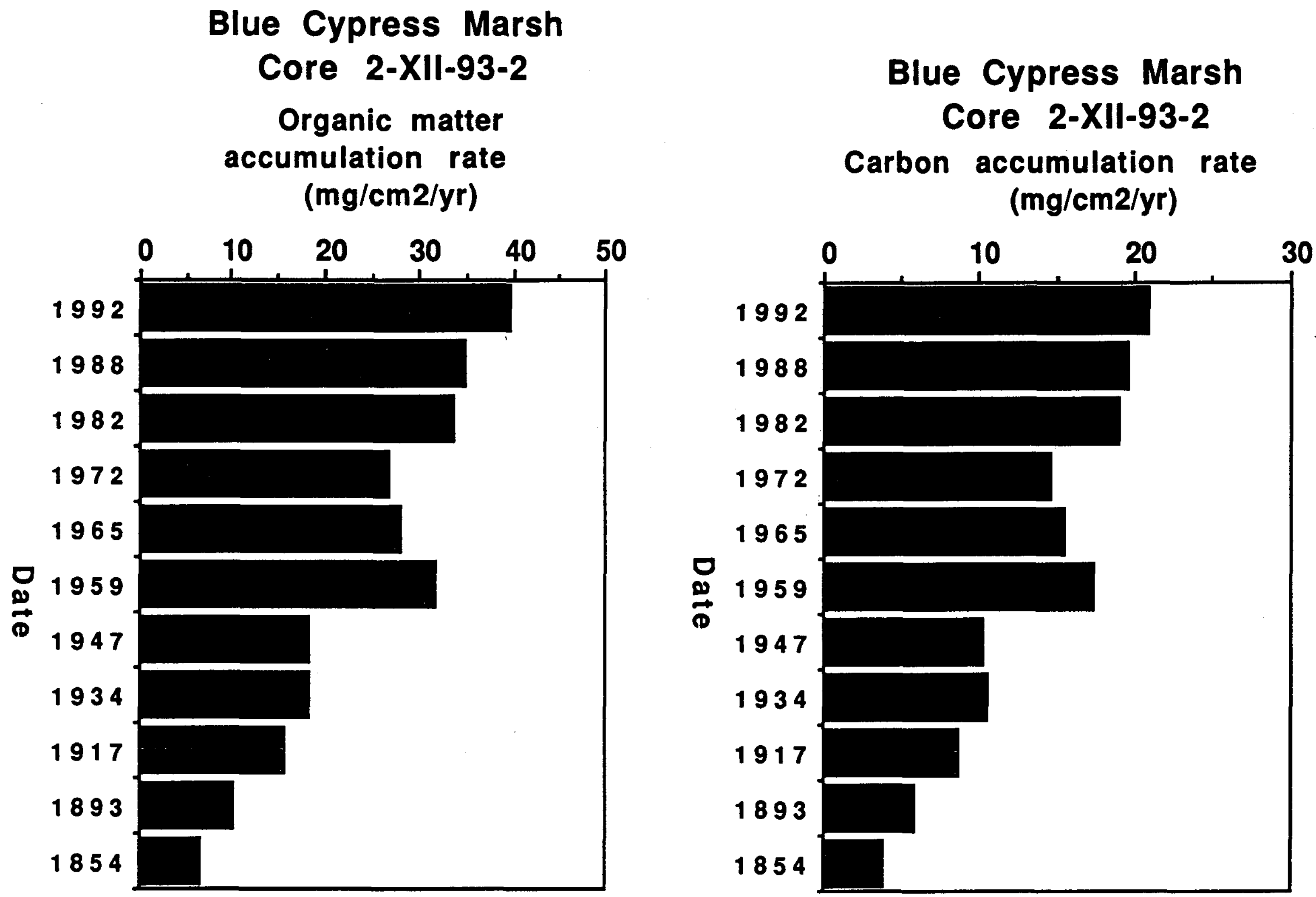
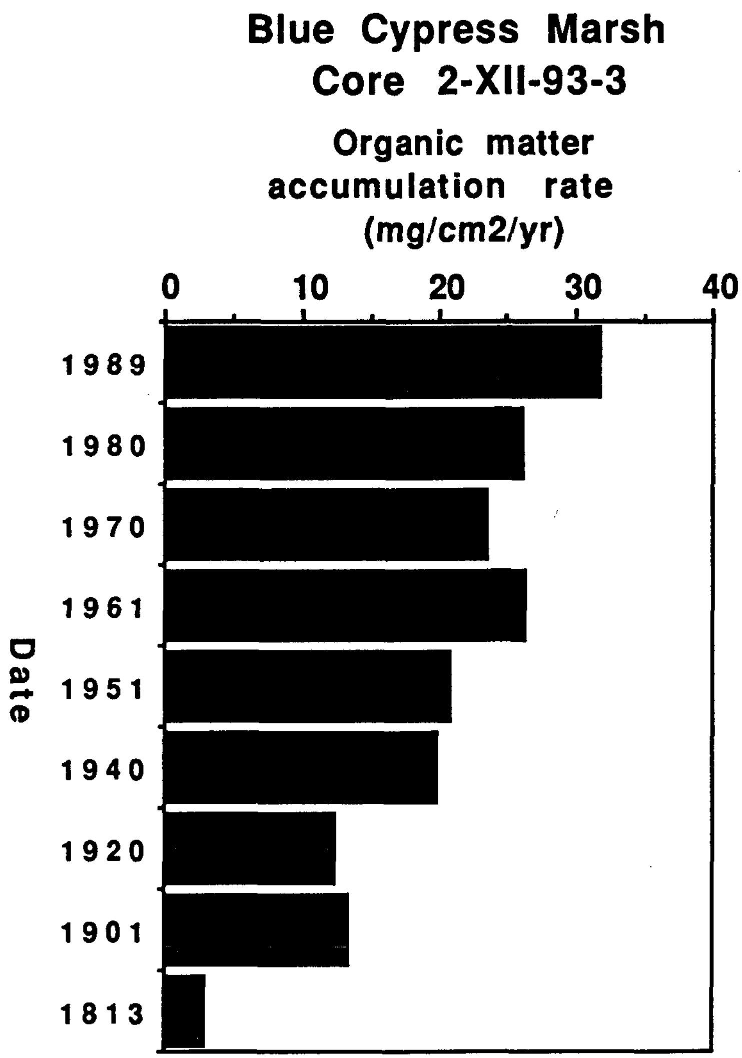


Figure 80. Blue Cypress Marsh Core 2-XII-93-2 organic matter accumulation rate (mg cm^{-2} yr^{-1}) and carbon accumulation rate (mg cm^{-2} yr^{-1}).



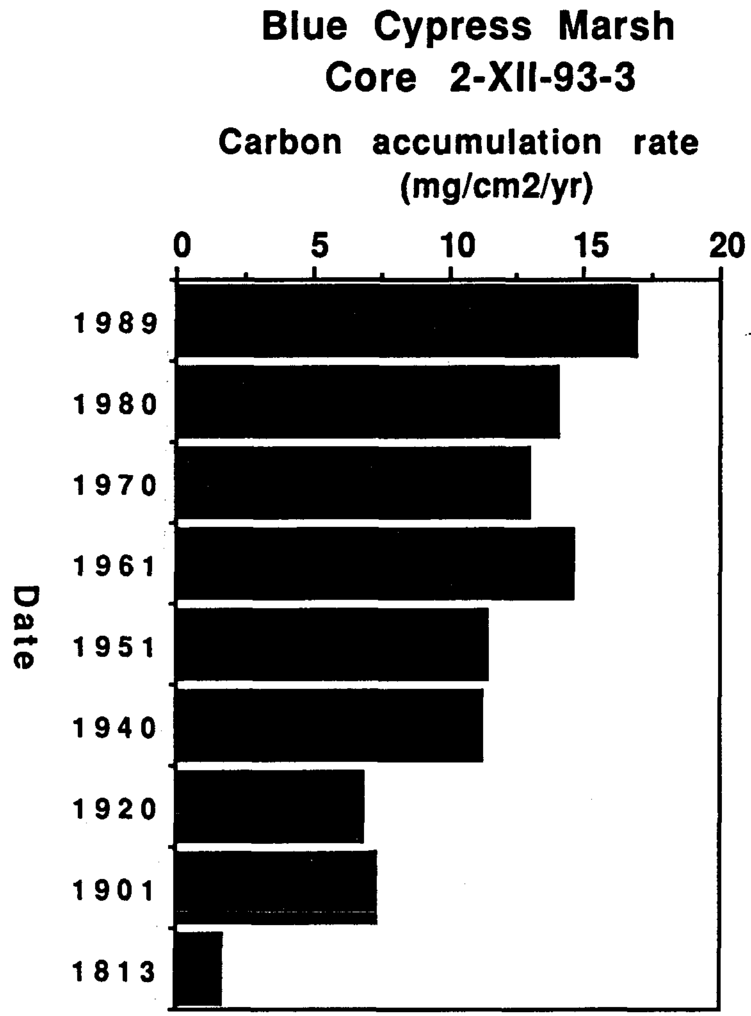


Figure 81. Blue Cypress Marsh Core 2-XII-93-3 organic matter accumulation rate (mg cm^{-2} yr^{-1}) and carbon accumulation rate (mg cm^{-2} yr^{-1}).

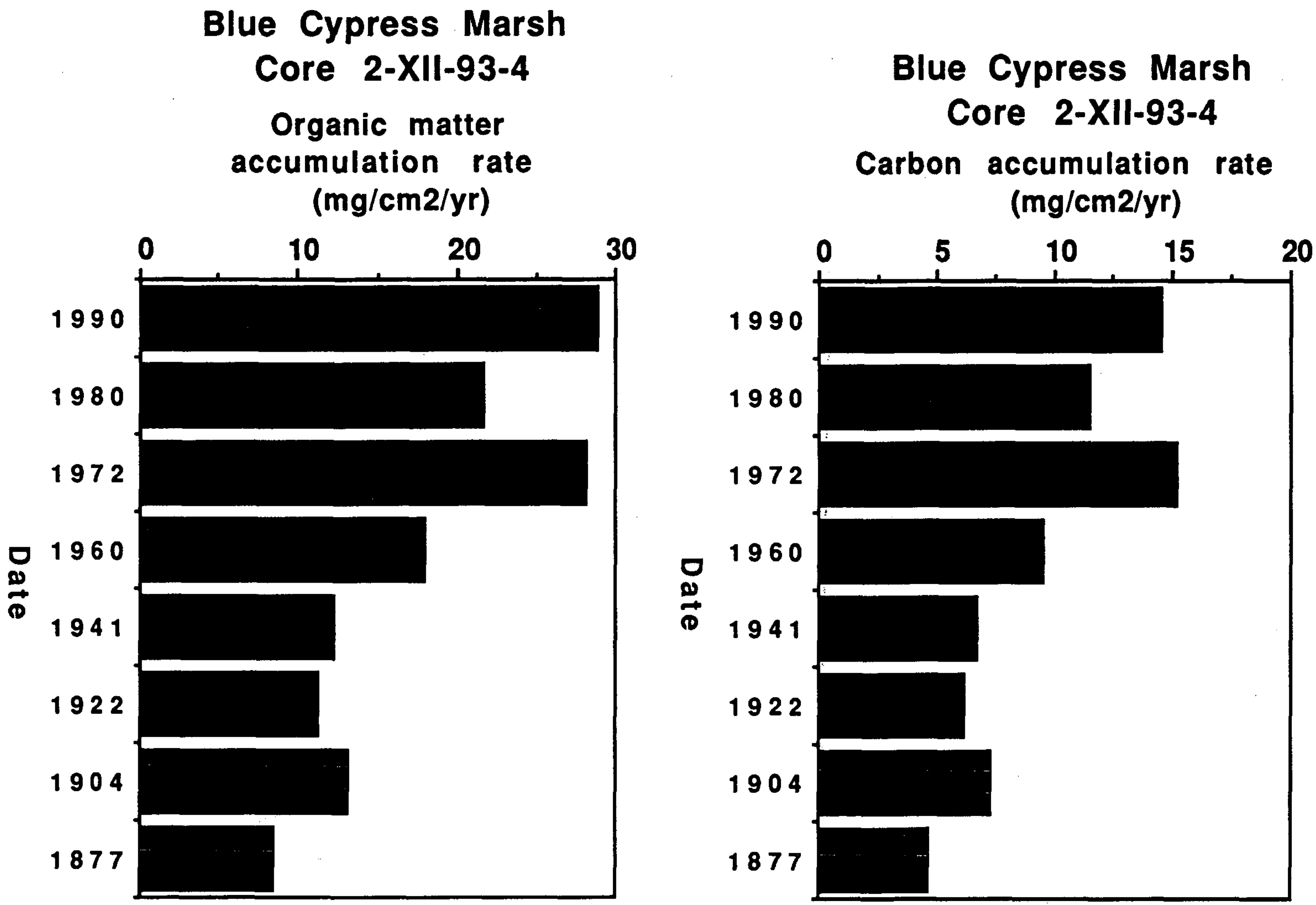


Figure 82. Blue Cypress Marsh Core 2-XII-93-4 organic matter accumulation rate (mg cm^{-2} yr^{-1}) and carbon accumulation rate (mg cm^{-2} yr^{-1}).

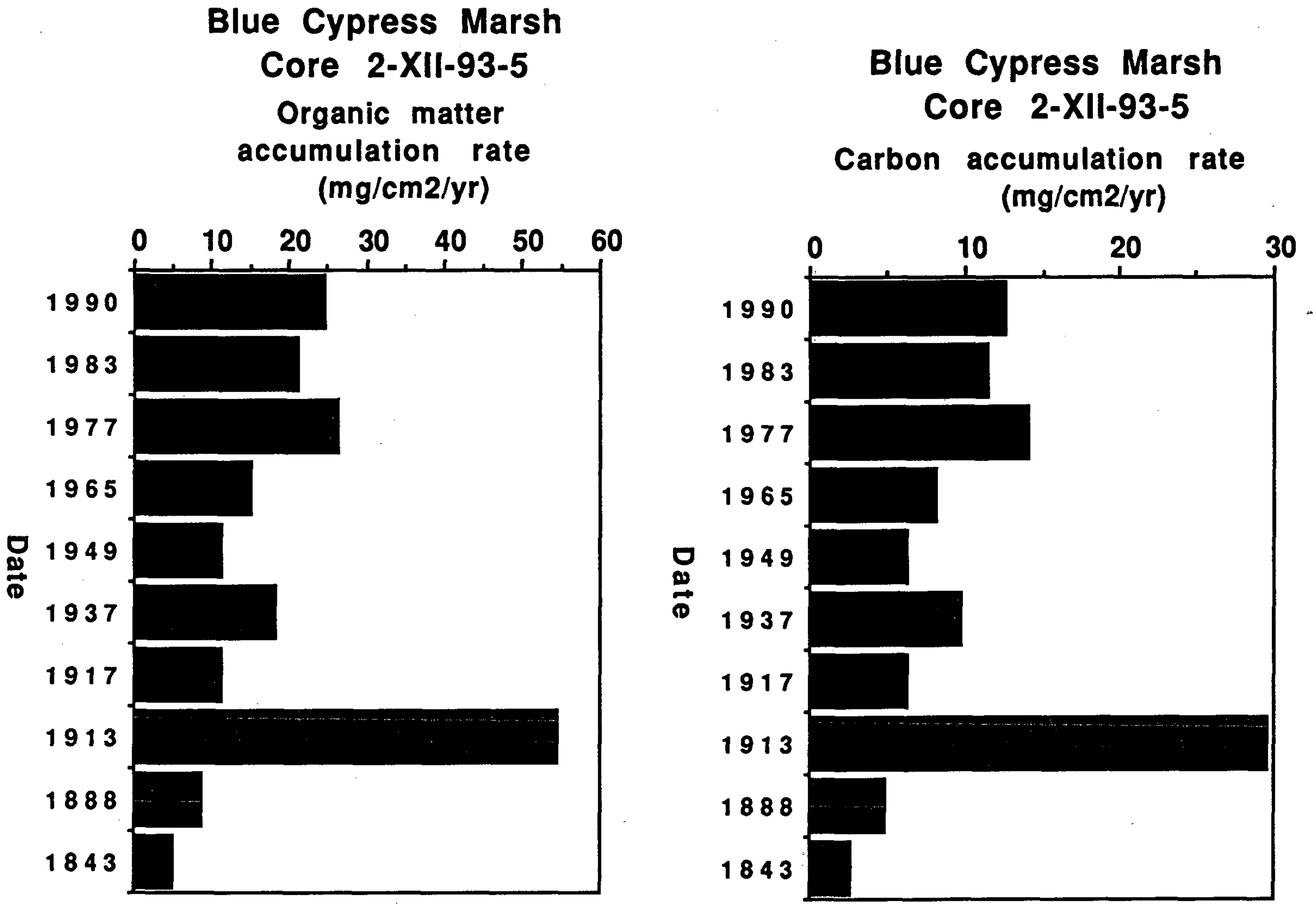


Figure 83. Blue Cypress Marsh Core 2-XII-93-5 organic matter accumulation rate (mg cm^{-2} yr^{-1}) and carbon accumulation rate (mg cm^{-2} yr^{-1}).

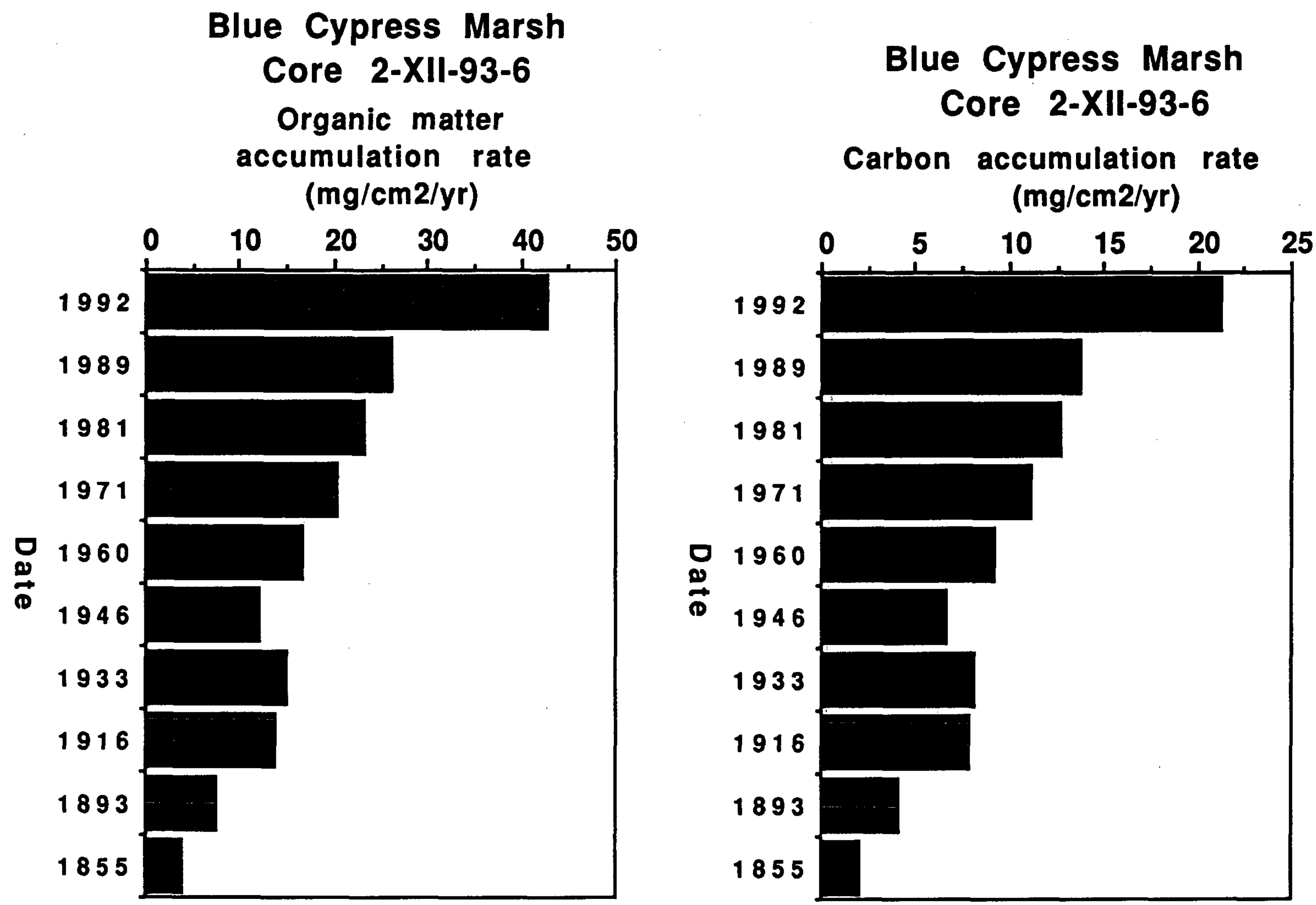


Figure 84. Blue Cypress Marsh Core 2-XII-93-6 organic matter accumulation rate (mg cm^{-2} yr^{-1}) and carbon accumulation rate (mg cm^{-2} yr^{-1}).

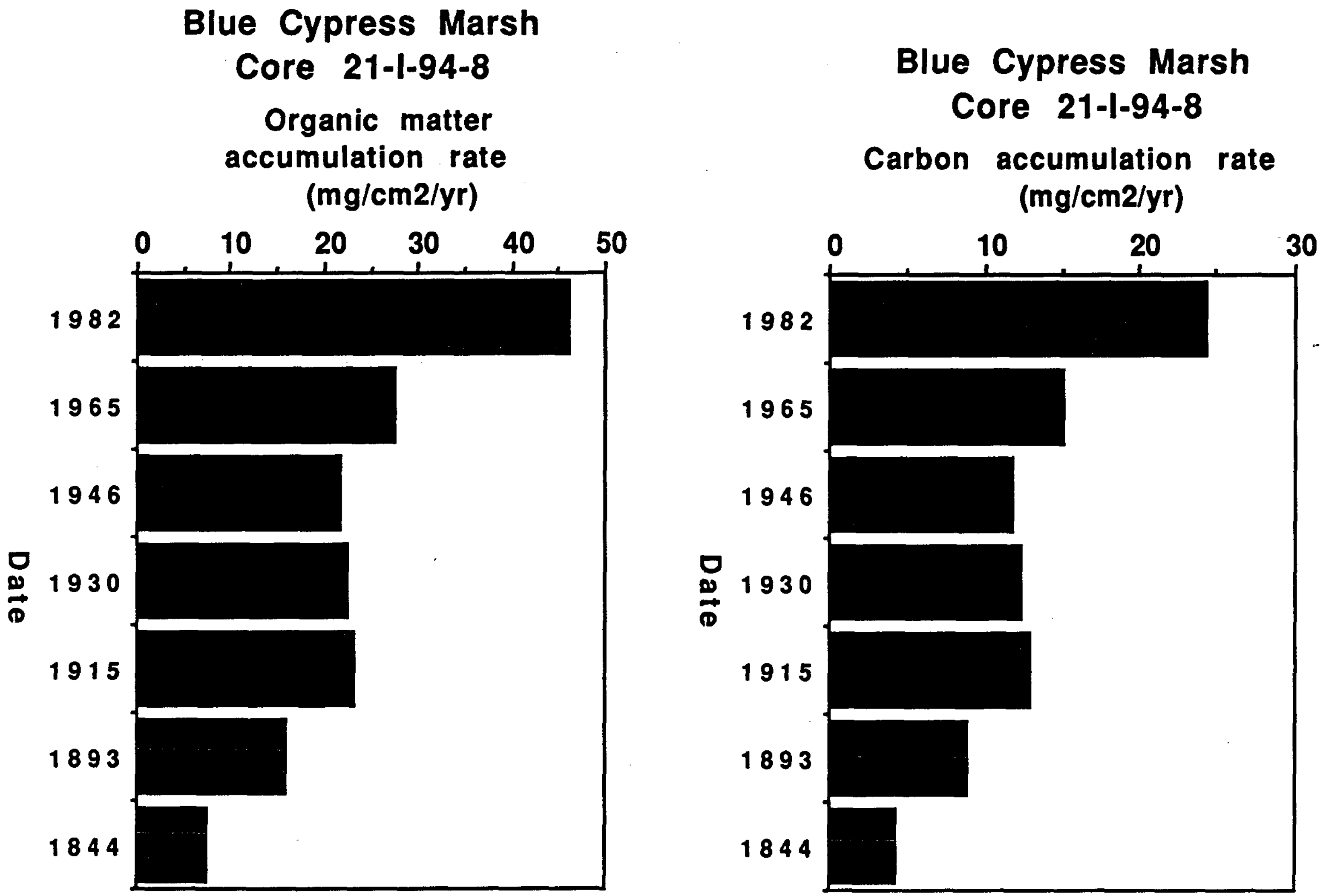


Figure 85. Blue Cypress Marsh Core 21-I-94-8 organic matter accumulation rate (mg cm^{-2} yr^{-1}) and carbon accumulation rate (mg cm^{-2} yr^{-1}).

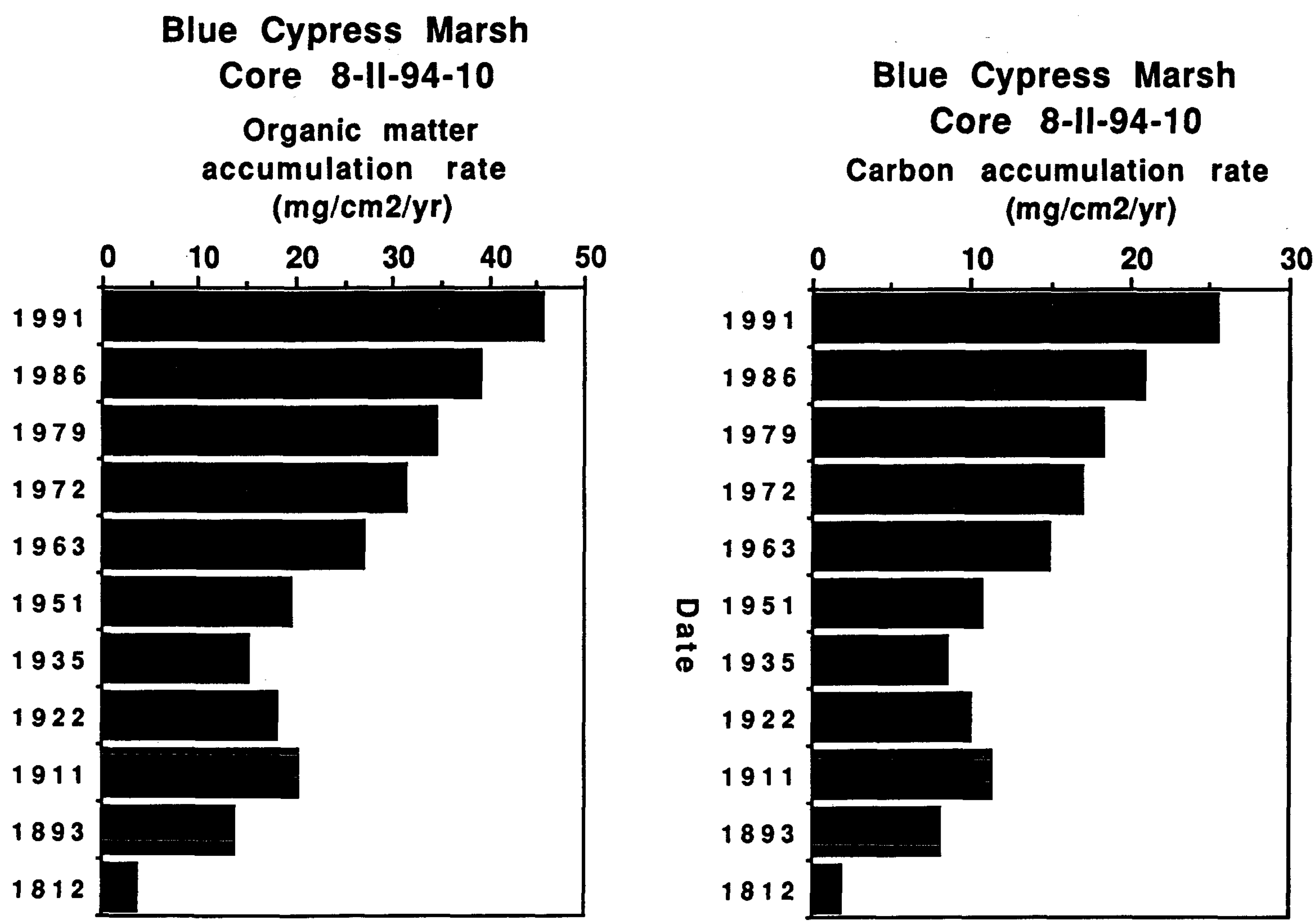


Figure 86. Blue Cypress Marsh Core 8-II-94-10 organic matter accumulation rate (mg cm^{-2} yr^{-1}) and carbon accumulation rate (mg cm^{-2} yr^{-1}).

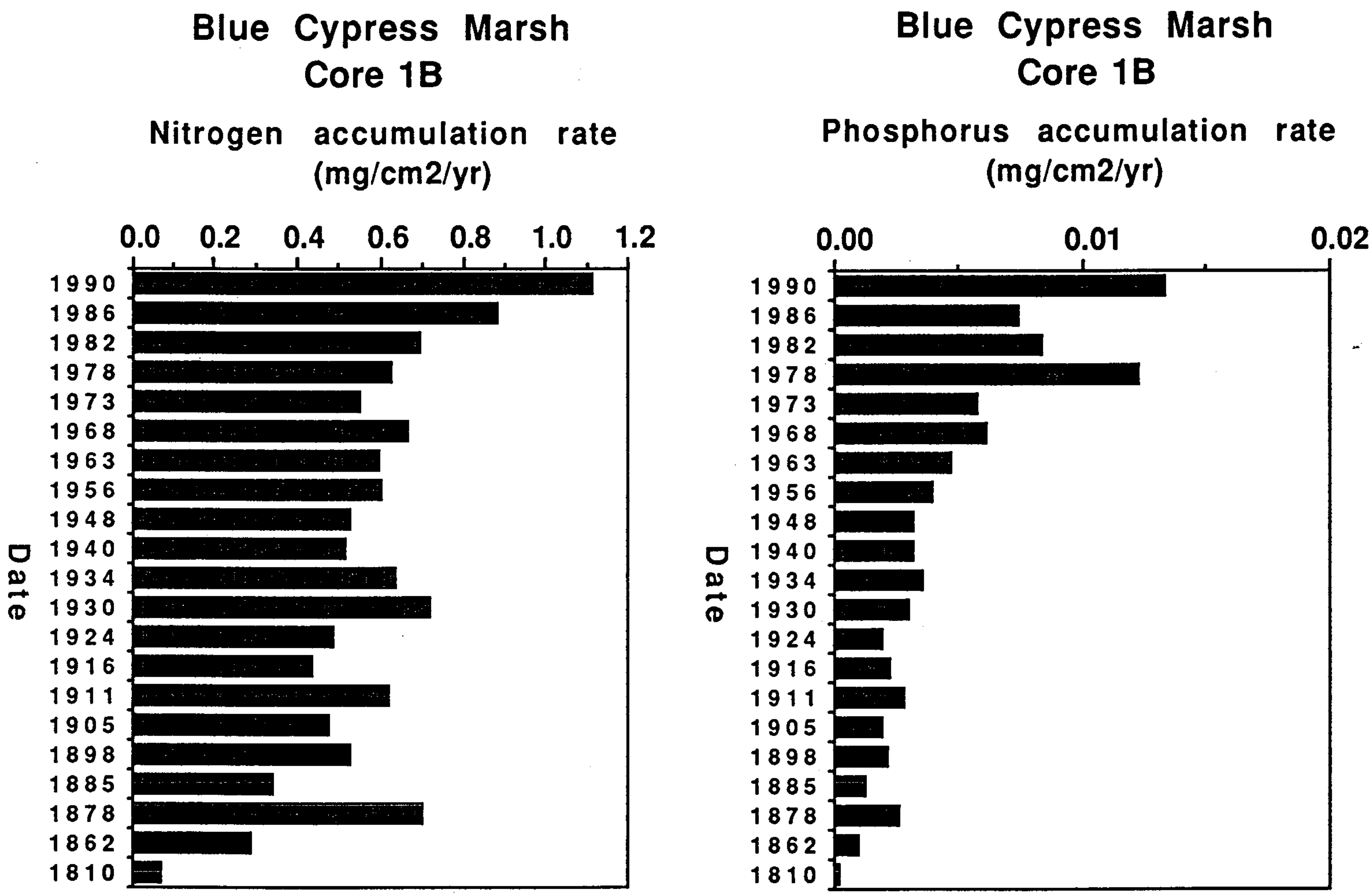


Figure 87. Blue Cypress Marsh Core 1B nitrogen accumulation rate (mg cm^{-2} yr^{-1}) and phosphorus accumulation rate (mg cm^{-2} yr^{-1}).

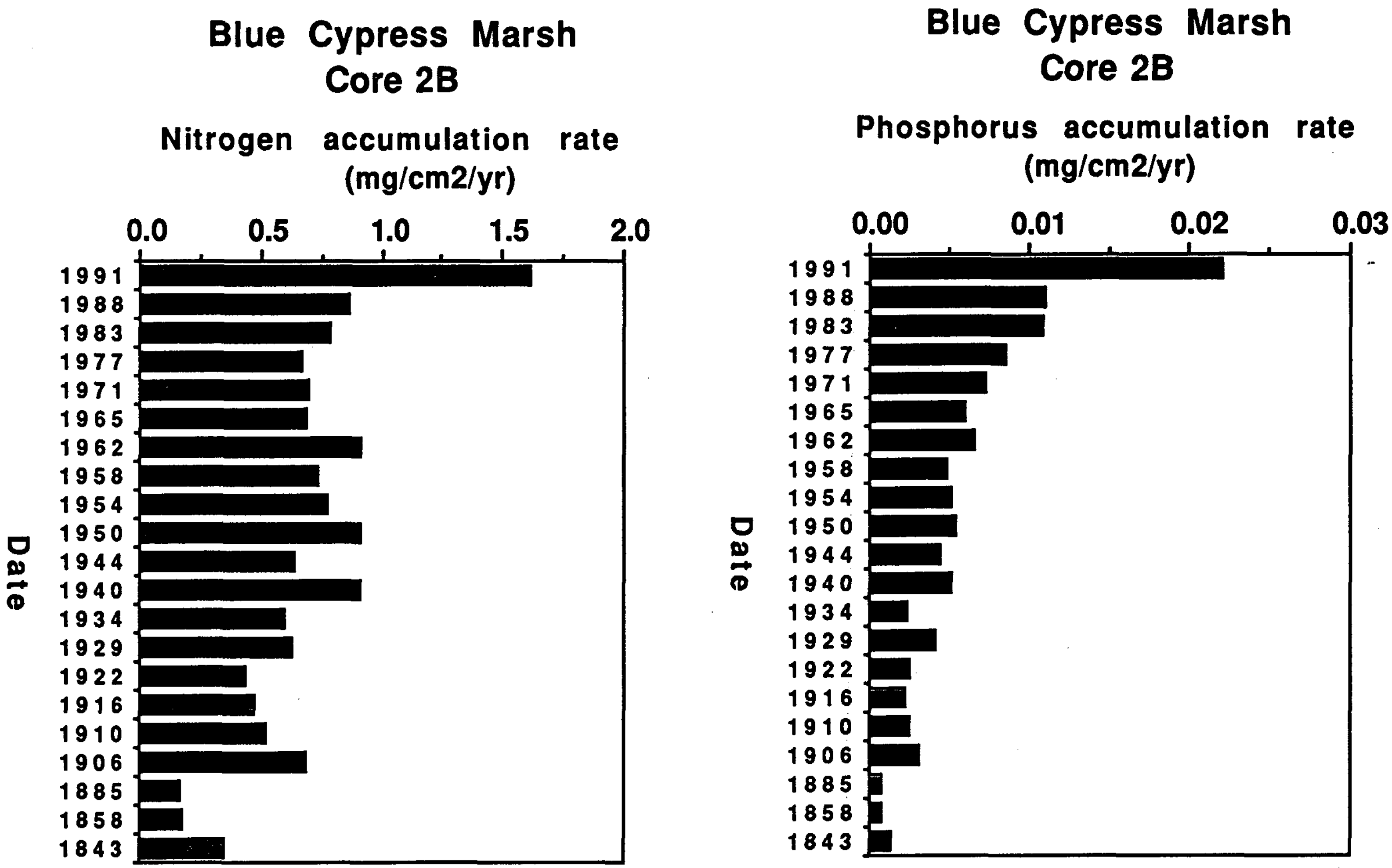


Figure 88. Blue Cypress Marsh Core 2B nitrogen accumulation rate (mg cm^{-2} yr^{-1}) and phosphorus accumulation rate (mg cm^{-2} yr^{-1}).

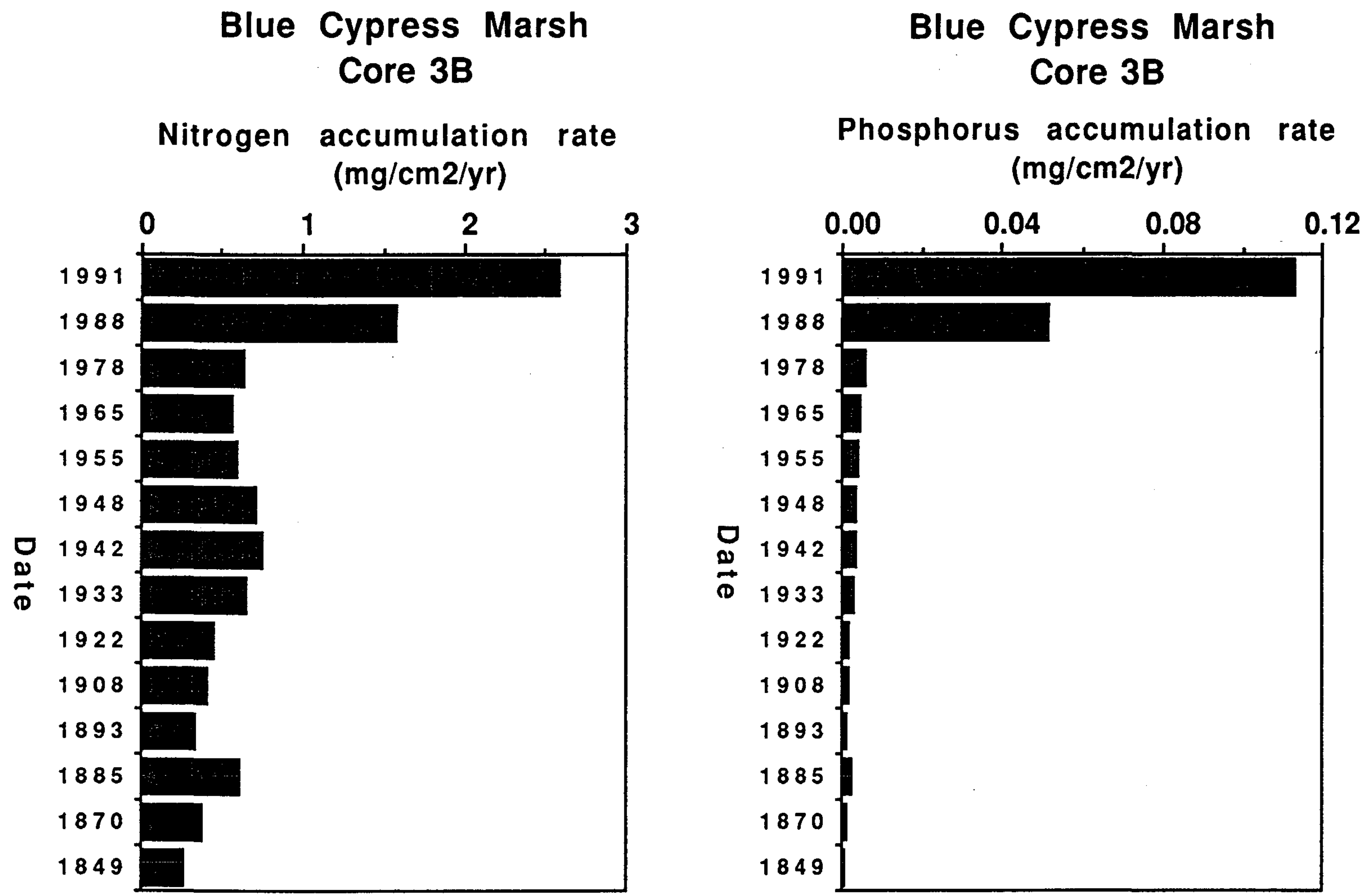


Figure 89. Blue Cypress Marsh Core 3B nitrogen accumulation rate (mg cm^{-2} yr^{-1}) and phosphorus accumulation rate (mg cm^{-2} yr^{-1}).

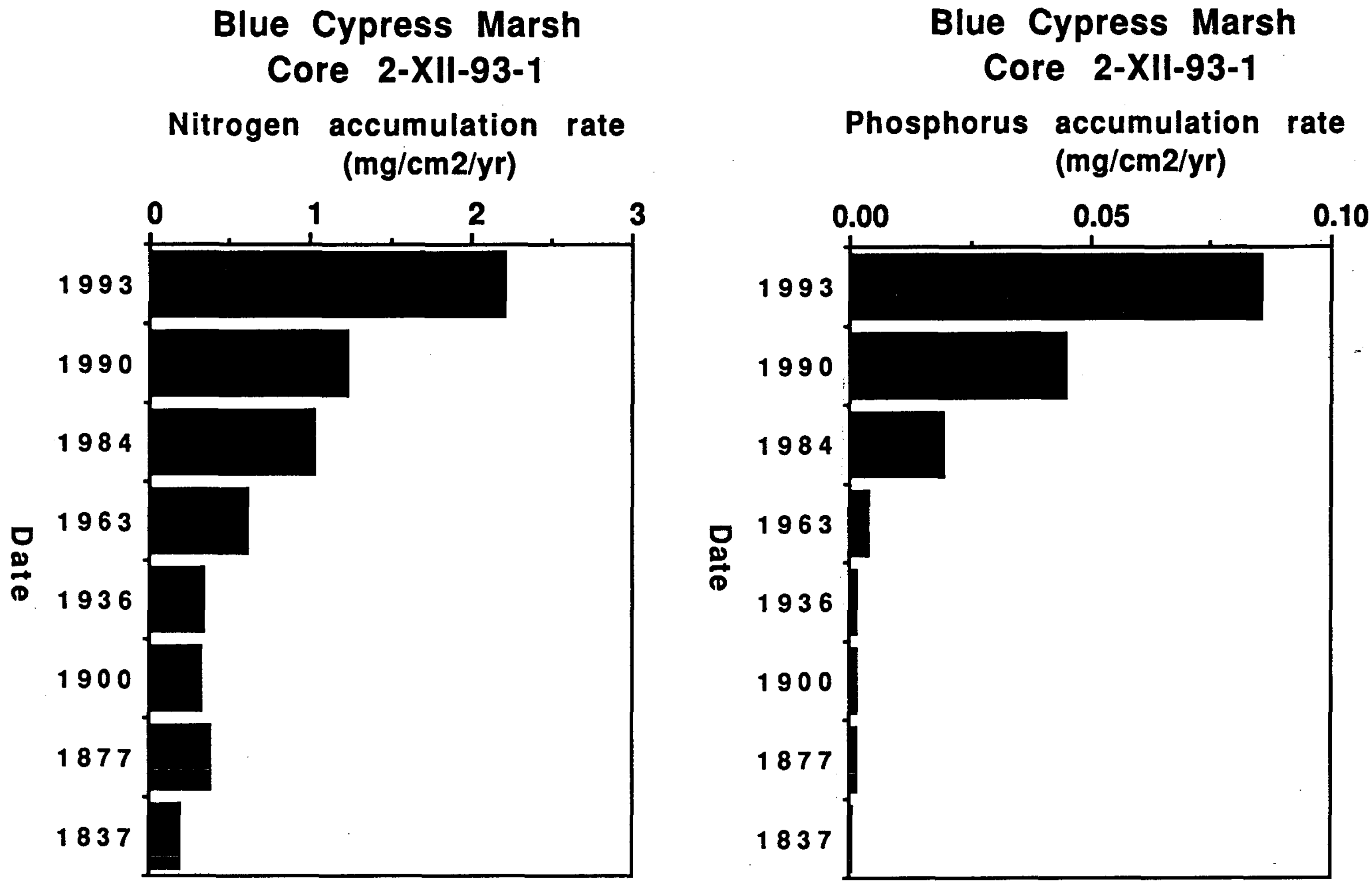


Figure 90. Blue Cypress Marsh Core 2-XII-93-1 nitrogen accumulation rate (mg cm^{-2} yr^{-1}) and phosphorus accumulation rate (mg cm^{-2} yr^{-1}).

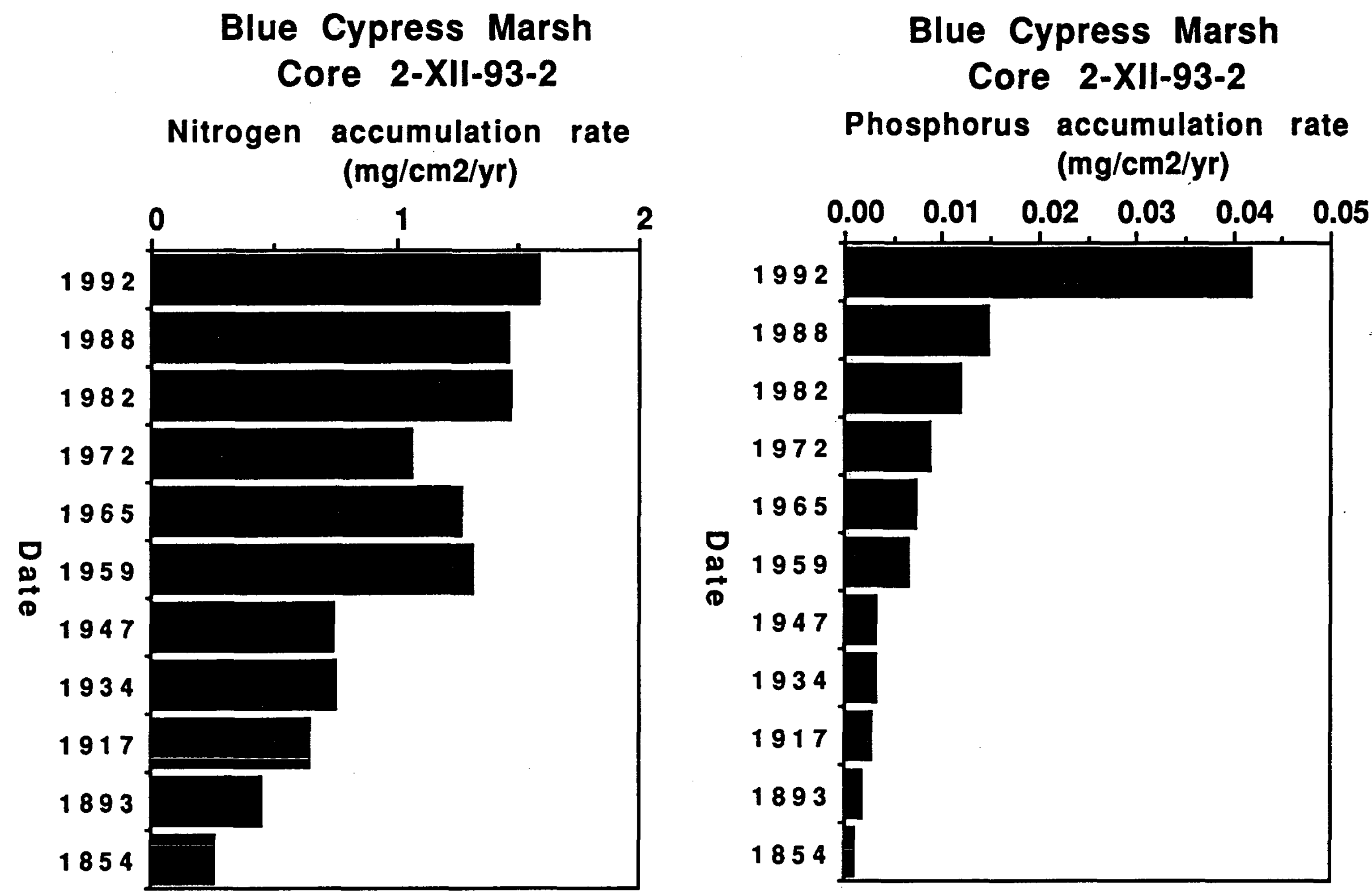


Figure 91. Blue Cypress Marsh Core 2-XII-93-2 nitrogen accumulation rate (mg cm^{-2} yr^{-1}) and phosphorus accumulation rate (mg cm^{-2} yr^{-1}).

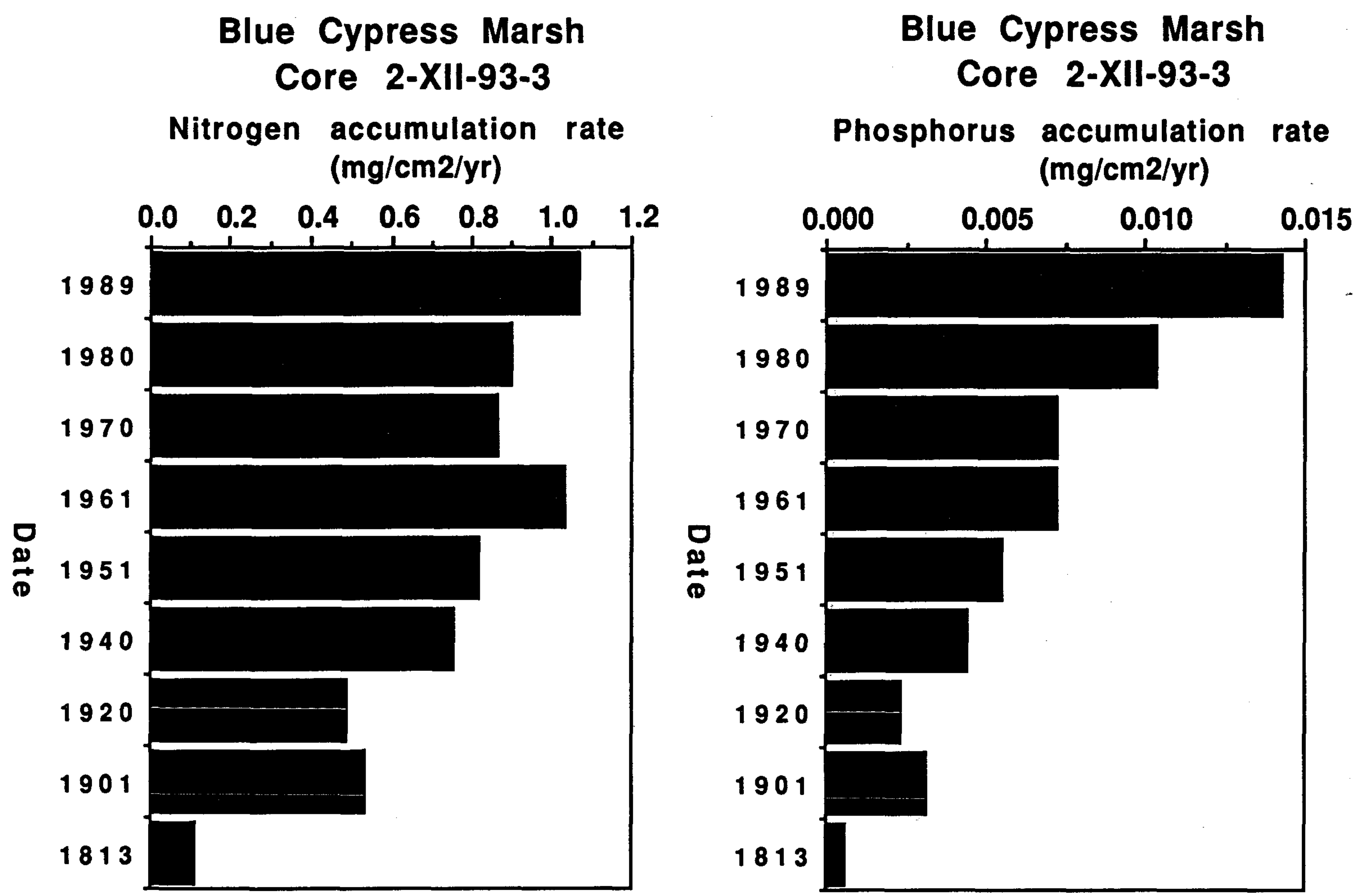
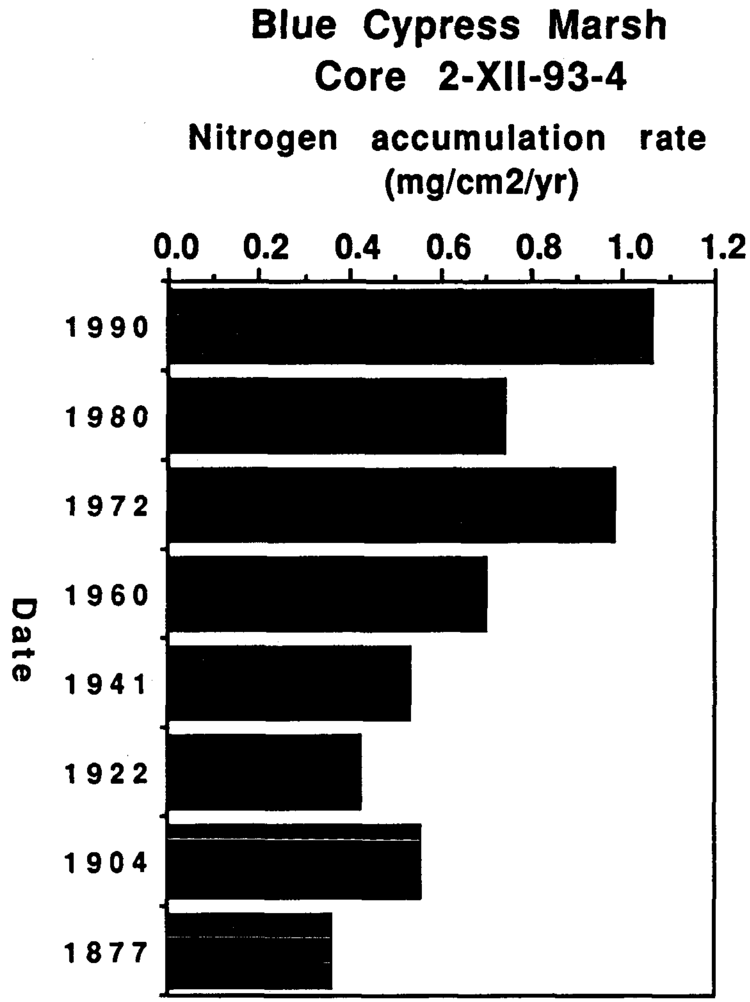


Figure 92. Blue Cypress Marsh Core 2-XII-93-3 nitrogen accumulation rate (mg cm^{-2} yr^{-1}) and phosphorus accumulation rate (mg cm^{-2} yr^{-1}).



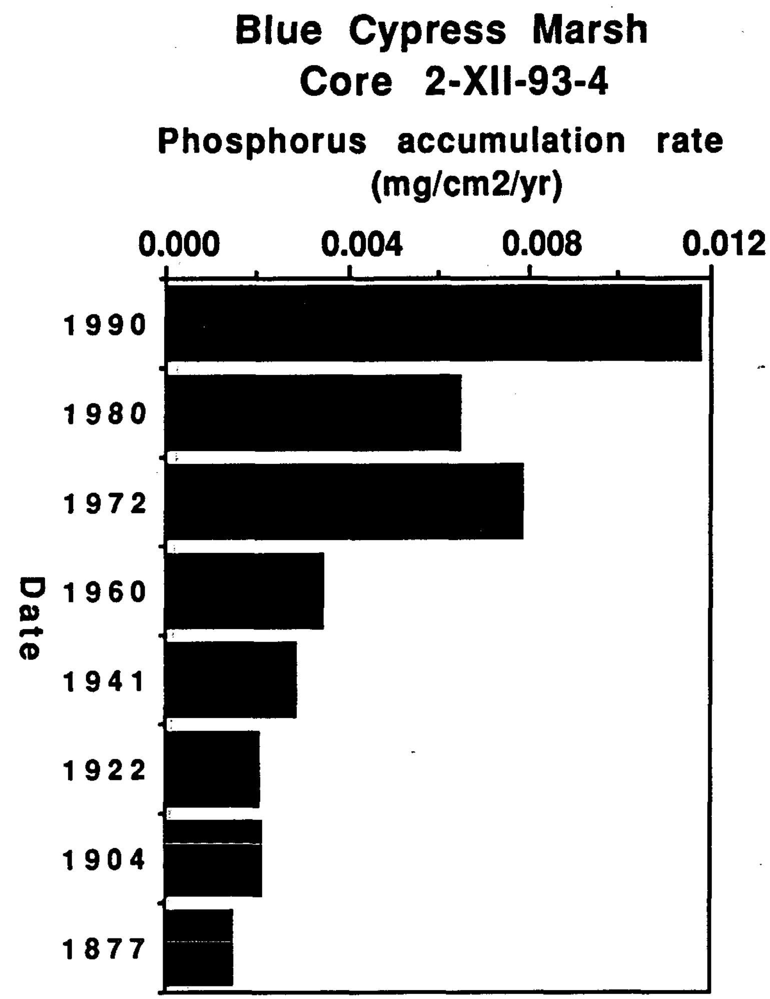


Figure 93. Blue Cypress Marsh Core 2-XII-93-4 nitrogen accumulation rate (mg cm^{-2} yr^{-1}) and phosphorus accumulation rate (mg cm^{-2} yr^{-1}).

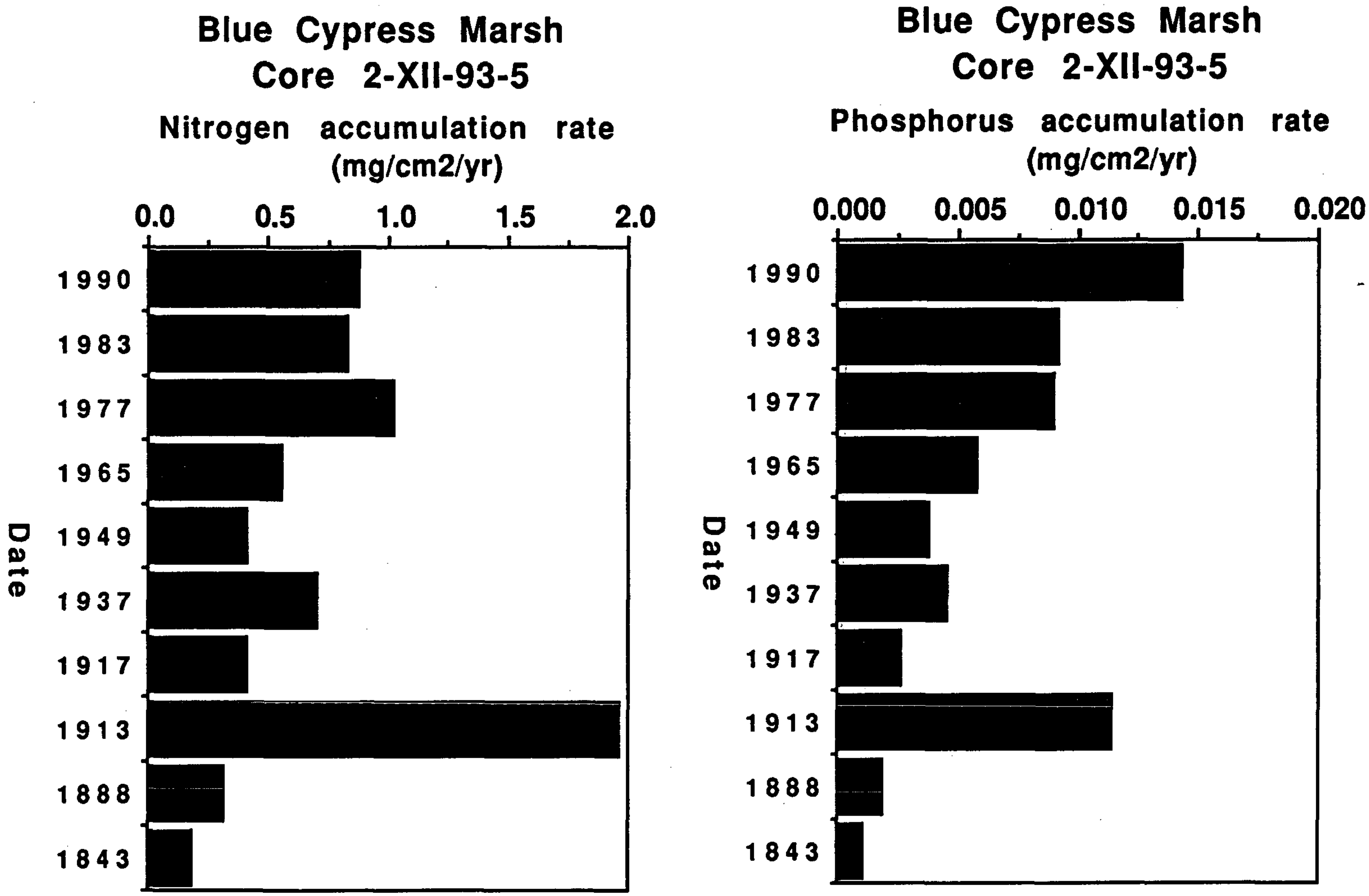
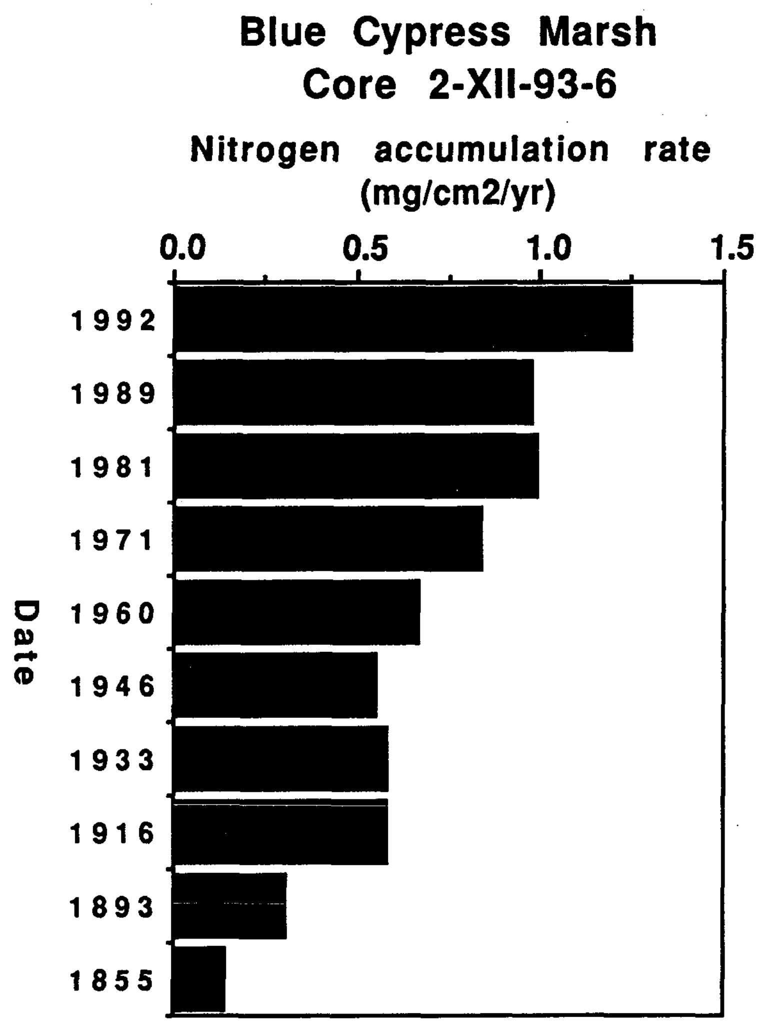


Figure 94. Blue Cypress Marsh Core 2-XII-93-5 nitrogen accumulation rate (mg cm^{-2} yr^{-1}) and phosphorus accumulation rate (mg cm^{-2} yr^{-1}).



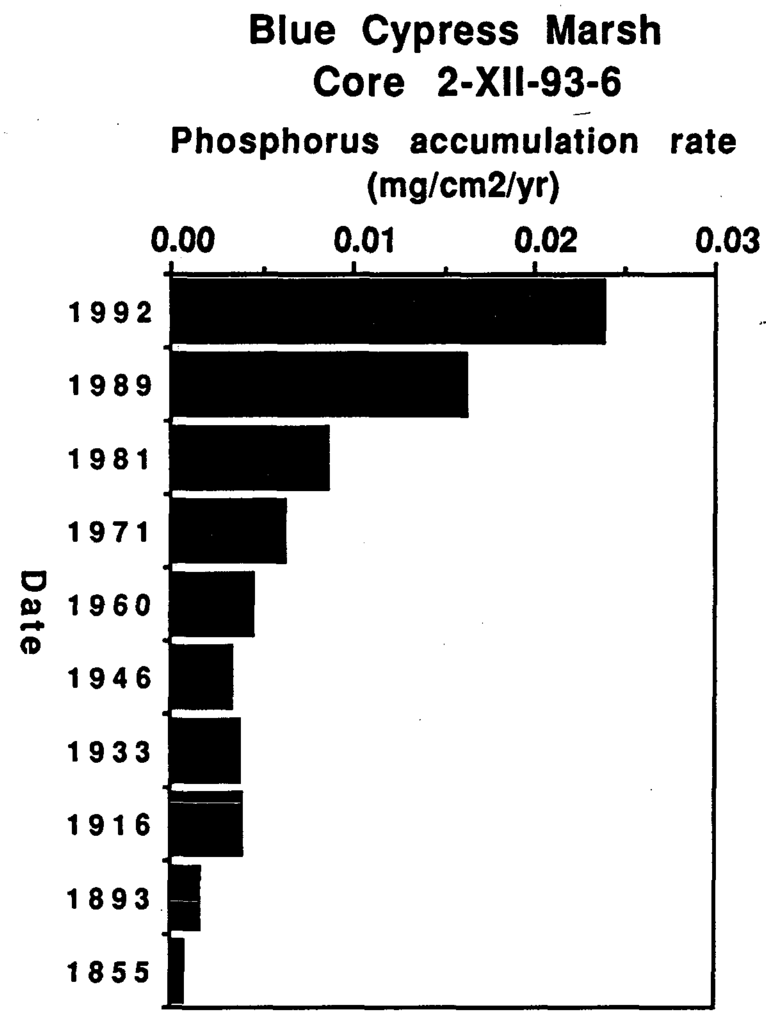


Figure 95. Blue Cypress Marsh Core 2-XII-93-6 nitrogen accumulation rate (mg cm^{-2} yr^{-1}) and phosphorus accumulation rate (mg cm^{-2} yr^{-1}).

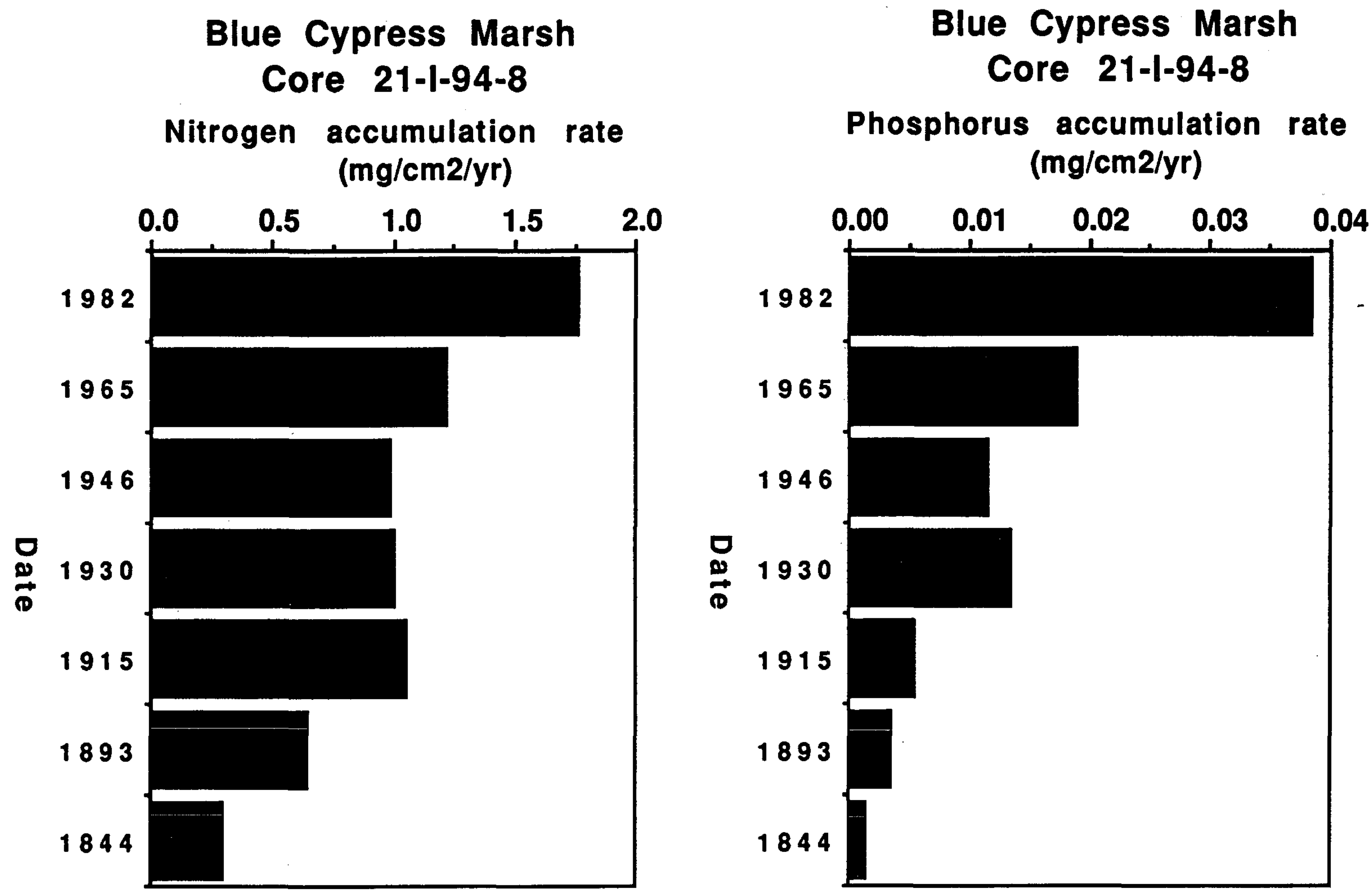


Figure 96. Blue Cypress Marsh Core 21-I-94-8 nitrogen accumulation rate (mg cm^{-2} yr^{-1}) and phosphorus accumulation rate (mg cm^{-2} yr^{-1}).

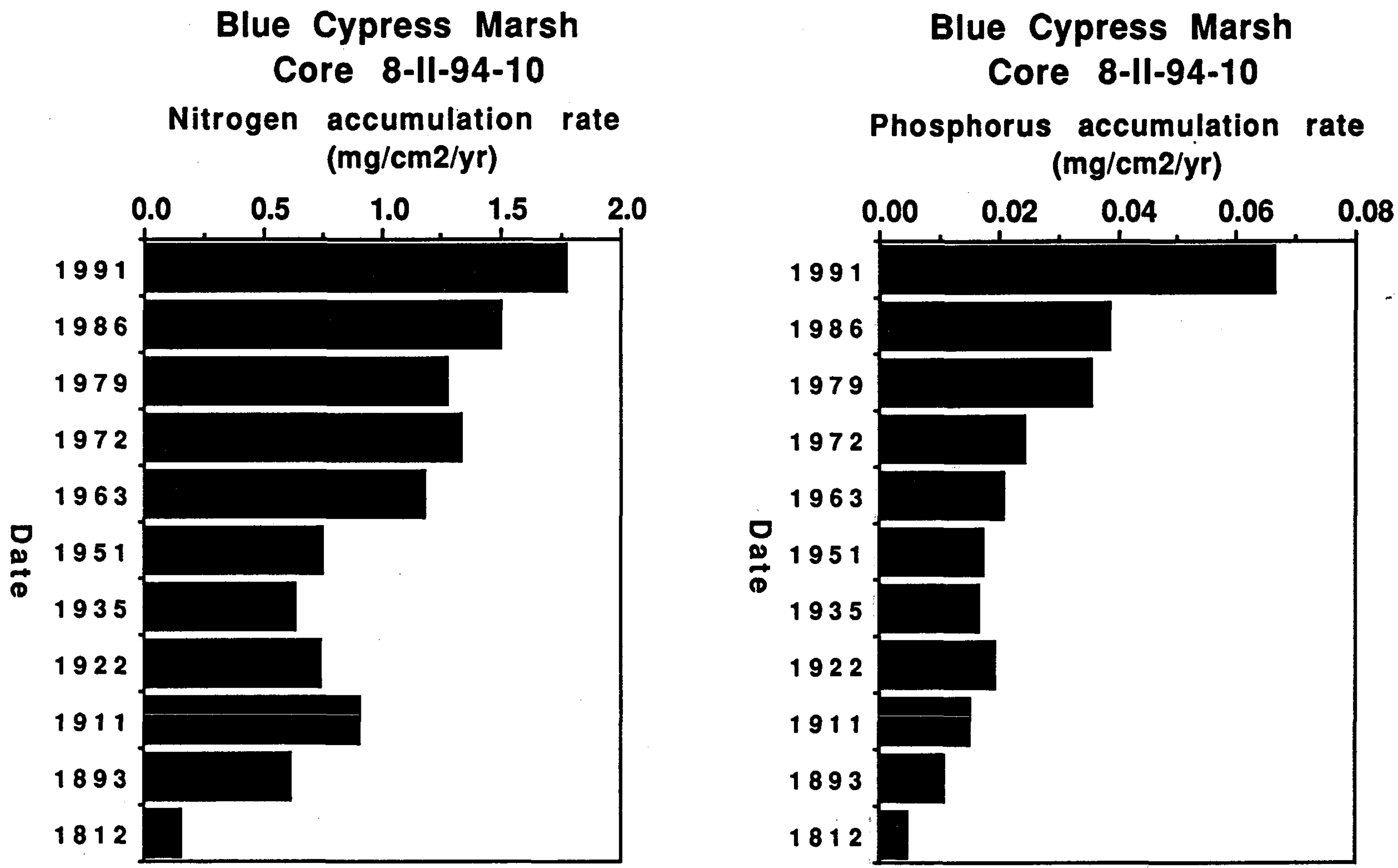


Figure 97. Blue Cypress Marsh Core 8-II-94-10 nitrogen accumulation rate (mg cm^{-2} yr^{-1}) and phosphorus accumulation rate (mg cm^{-2} yr^{-1}).

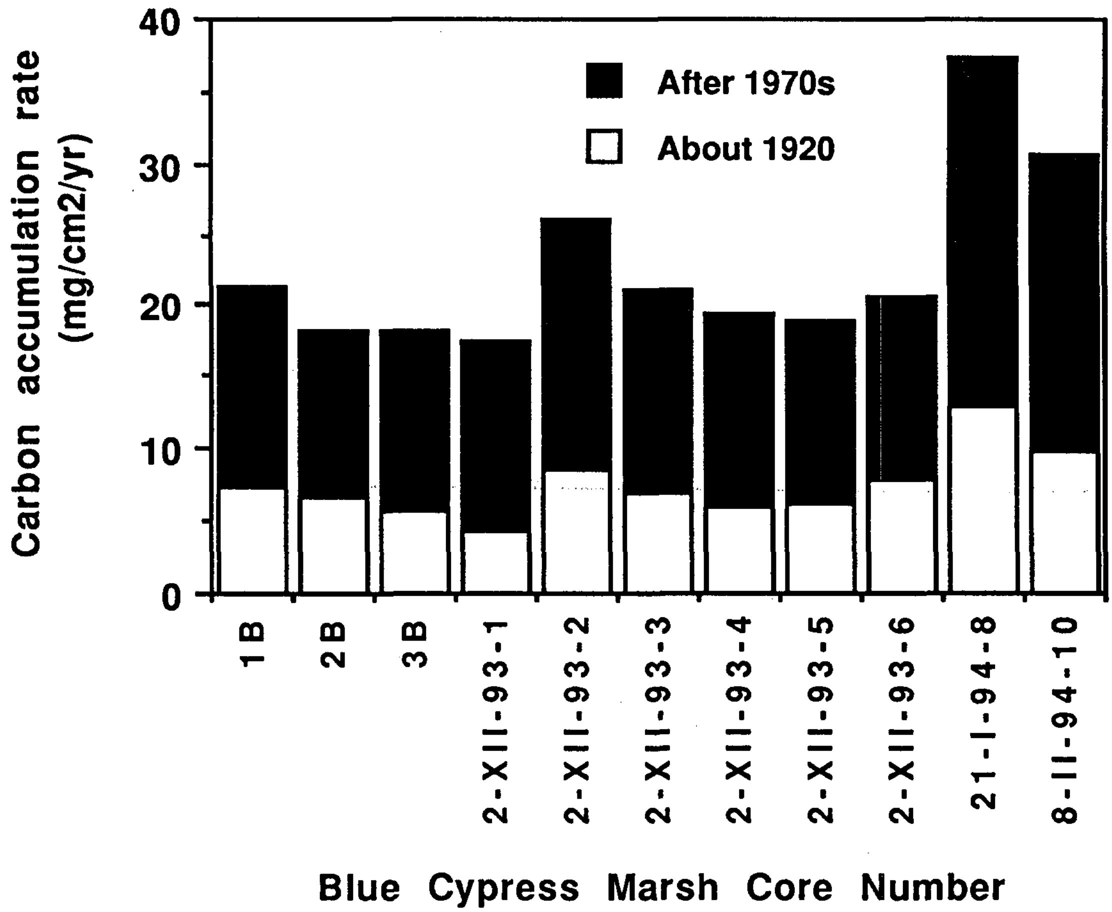


Figure 98. Comparison of carbon accumulation rates (mg cm^{-2} yr^{-1}) around 1920 with the prevailing mean rate since the 1970s for eleven cores from Blue Cypress Marsh. The accumulation rate for 1920 was selected from the core section with basal date closest to 1920. The "modern" rate was calculated as the mean nutrient accumulation rate for the period between the most recent date in the 1970s and the date the core was collected. In core 21-I-94-8, in which a 1970s date was lacking, the modern value represents the accumulation rate since 1982.

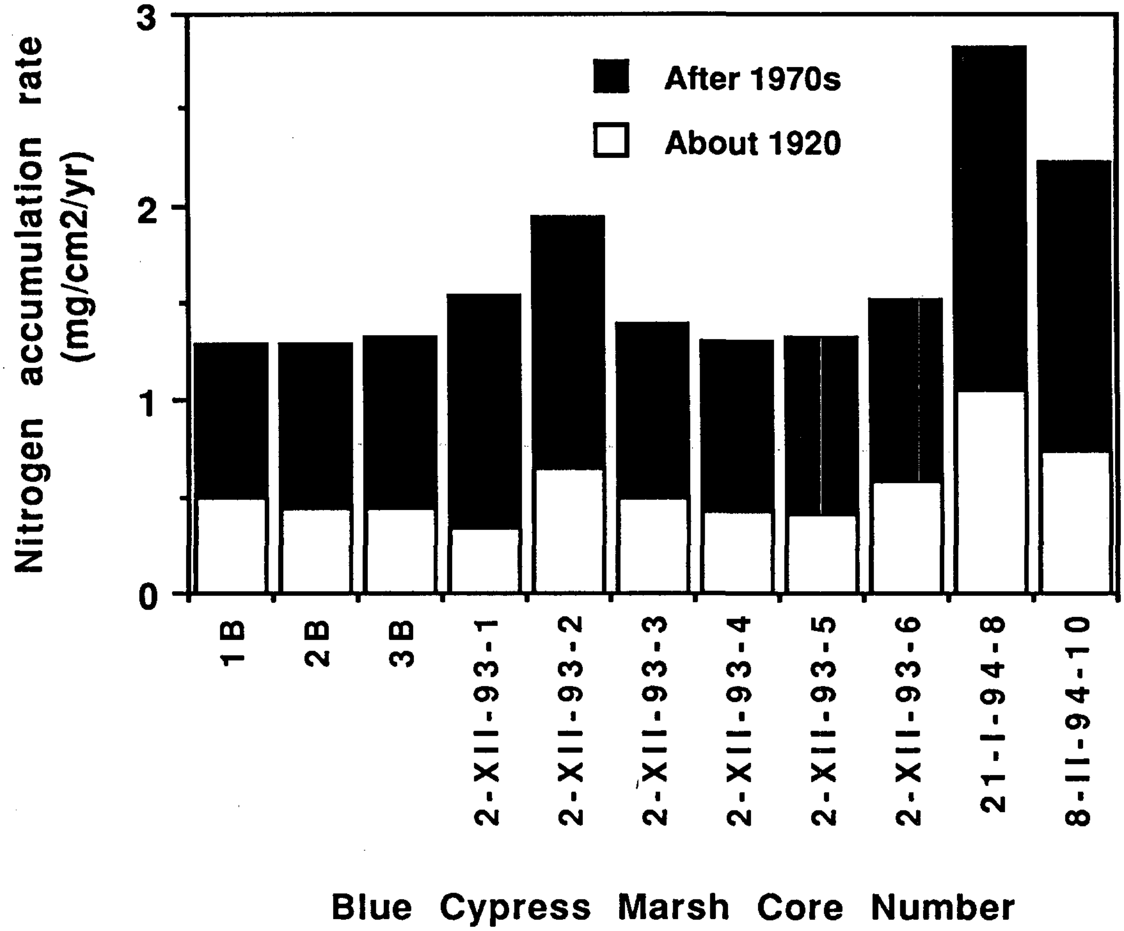


Figure 99. Comparison of nitrogen accumulation rates (mg cm^{-2} yr^{-1}) around 1920 with the prevailing mean rate since the 1970s for eleven cores from Blue Cypress Marsh. The accumulation rate for 1920 was selected from the core section with basal date closest to 1920. The "modern" rate was calculated as the mean nutrient accumulation rate for the period between the most recent date in the 1970s and the date the core was collected. In core 21-I-94-8, in which a 1970s date was lacking, the modern value represents the accumulation rate since 1982.

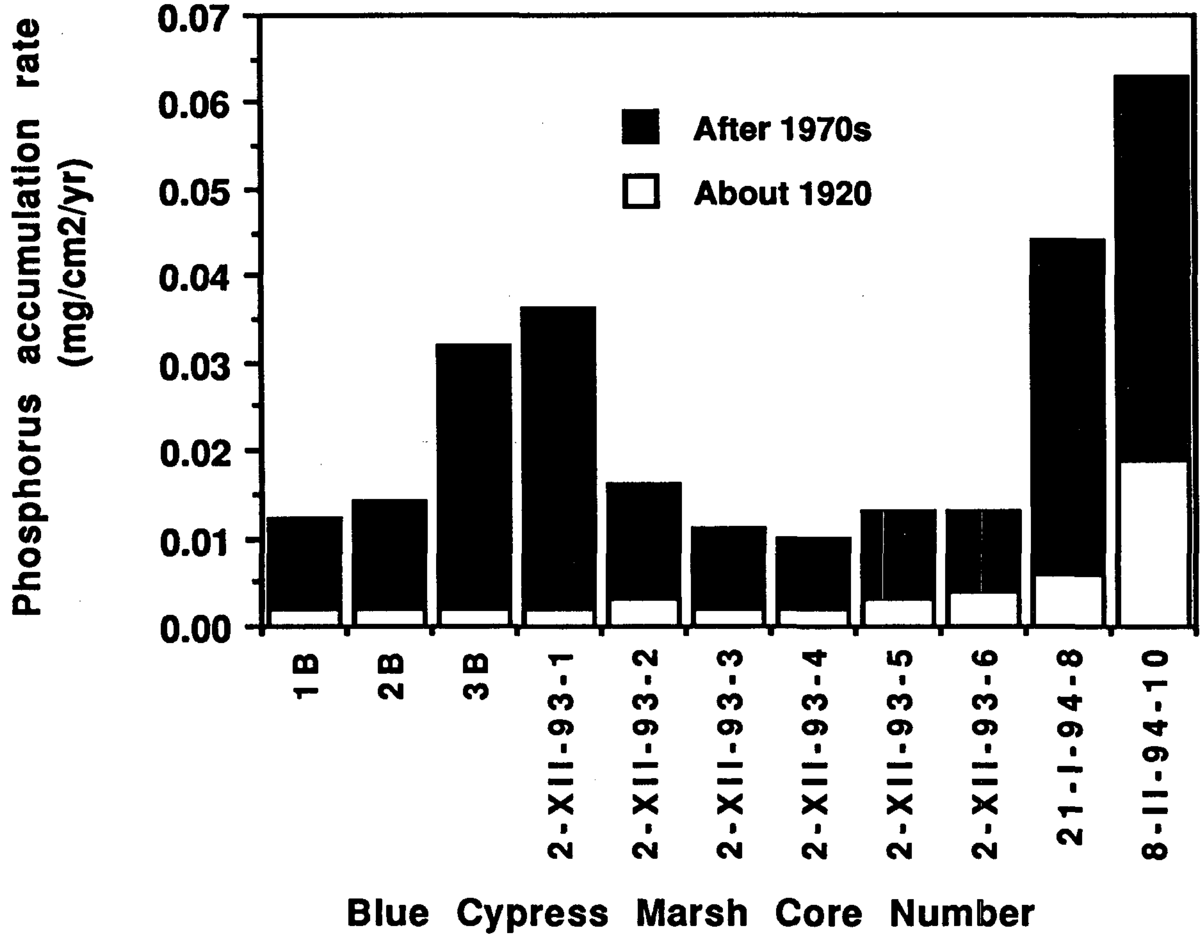


Figure 100. Comparison of phosphorus accumulation rates (mg cm^{-2} yr^{-1}) around 1920 with the prevailing mean rate since the 1970s for eleven cores from Blue Cypress Marsh. The accumulation rate for 1920 was selected from the core section with basal date closest to 1920. The "modern" rate was calculated as the mean nutrient accumulation rate for the period between the most recent date in the 1970s and the date the core was collected. In core 21-I-94-8, in which a 1970s date was lacking, the modern value represents the accumulation rate since 1982.

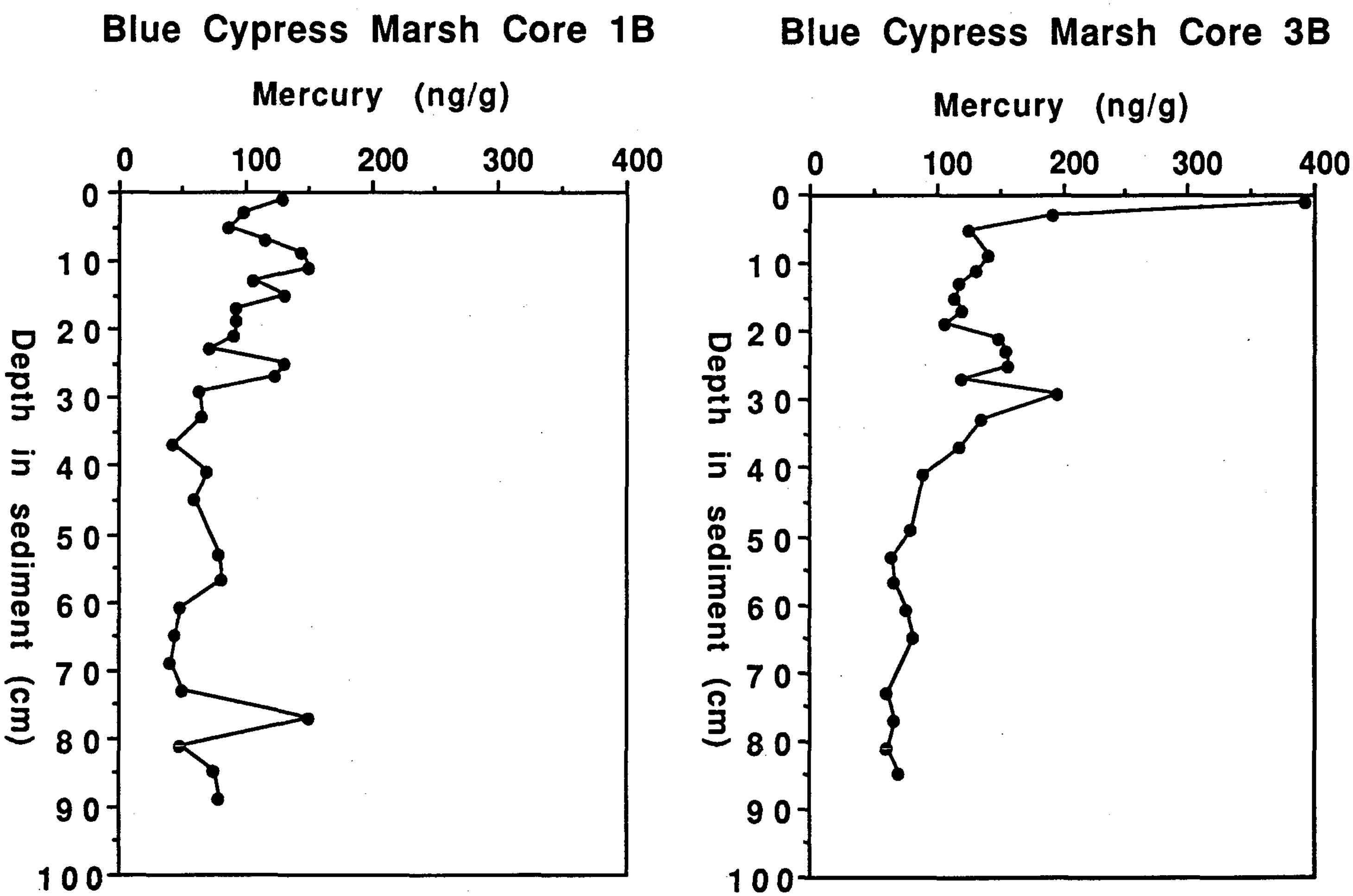


Figure 101. Mercury concentrations in sediments from Blue Cypress Marsh cores 1B and 3B.

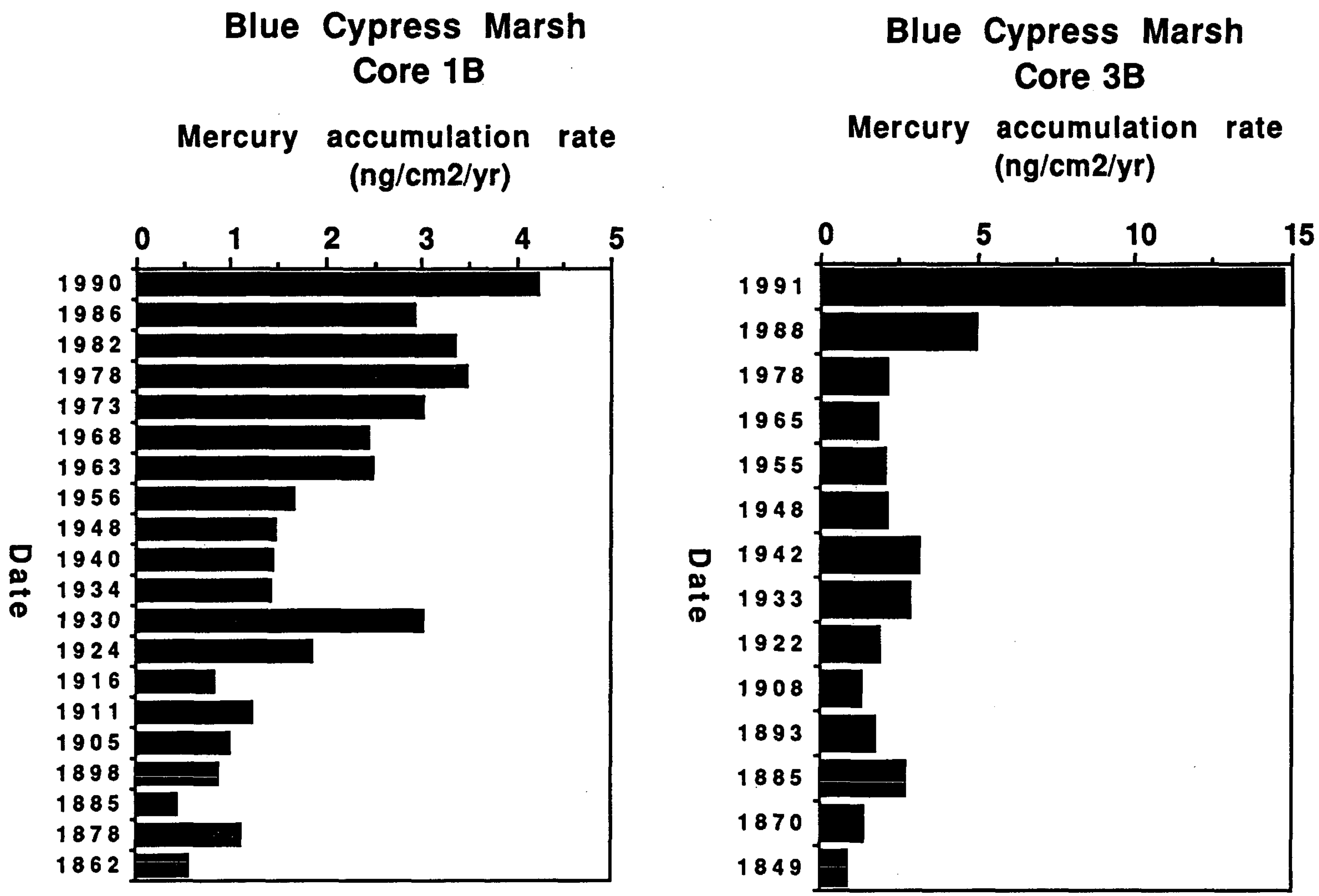


Figure 102. Mercury accumulation rates at Blue Cypress Marsh sites 1B and 3B.

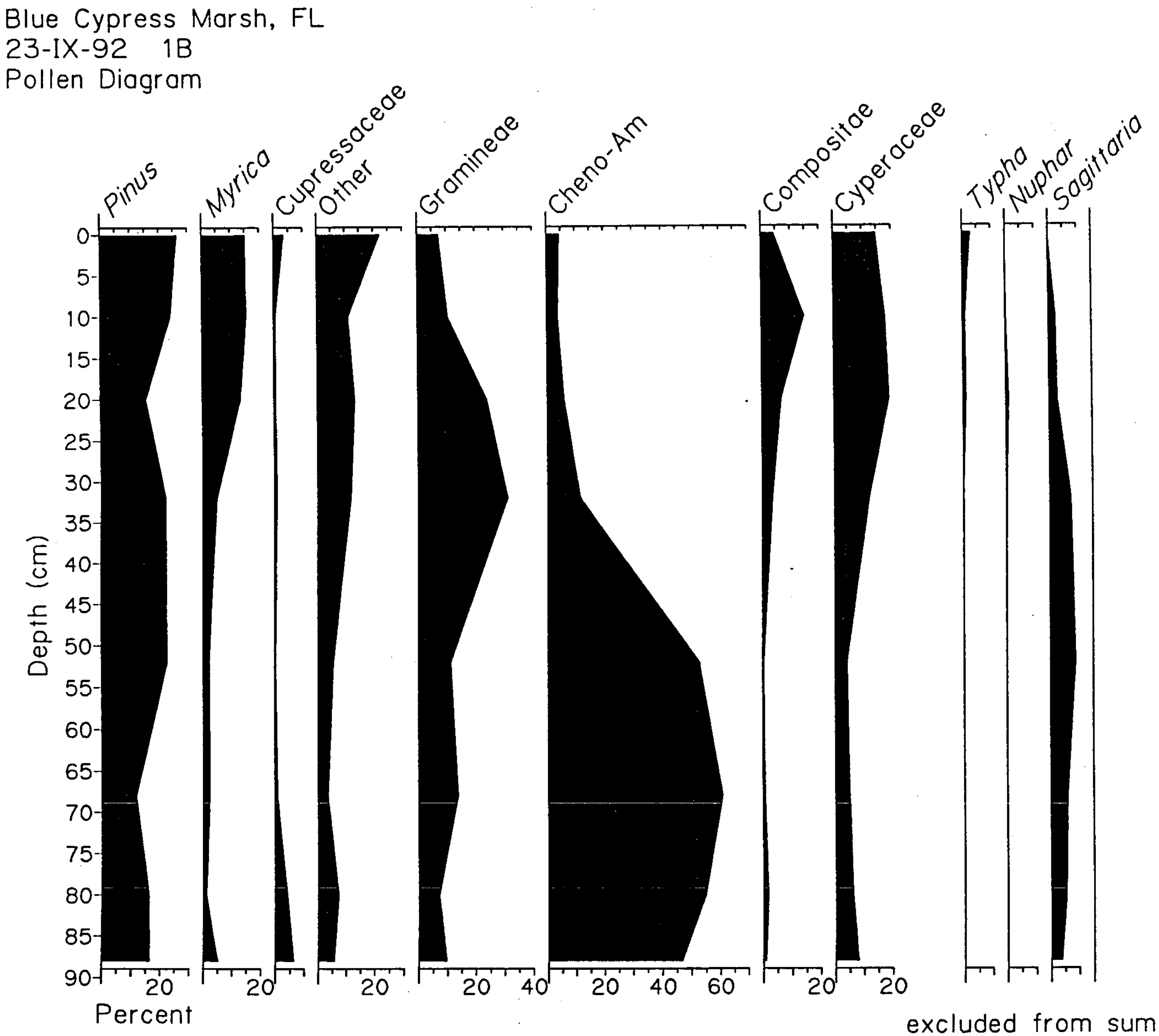


Figure 103. Relative abundance of pollen types in sediment from Blue Cypress Marsh core 1B.

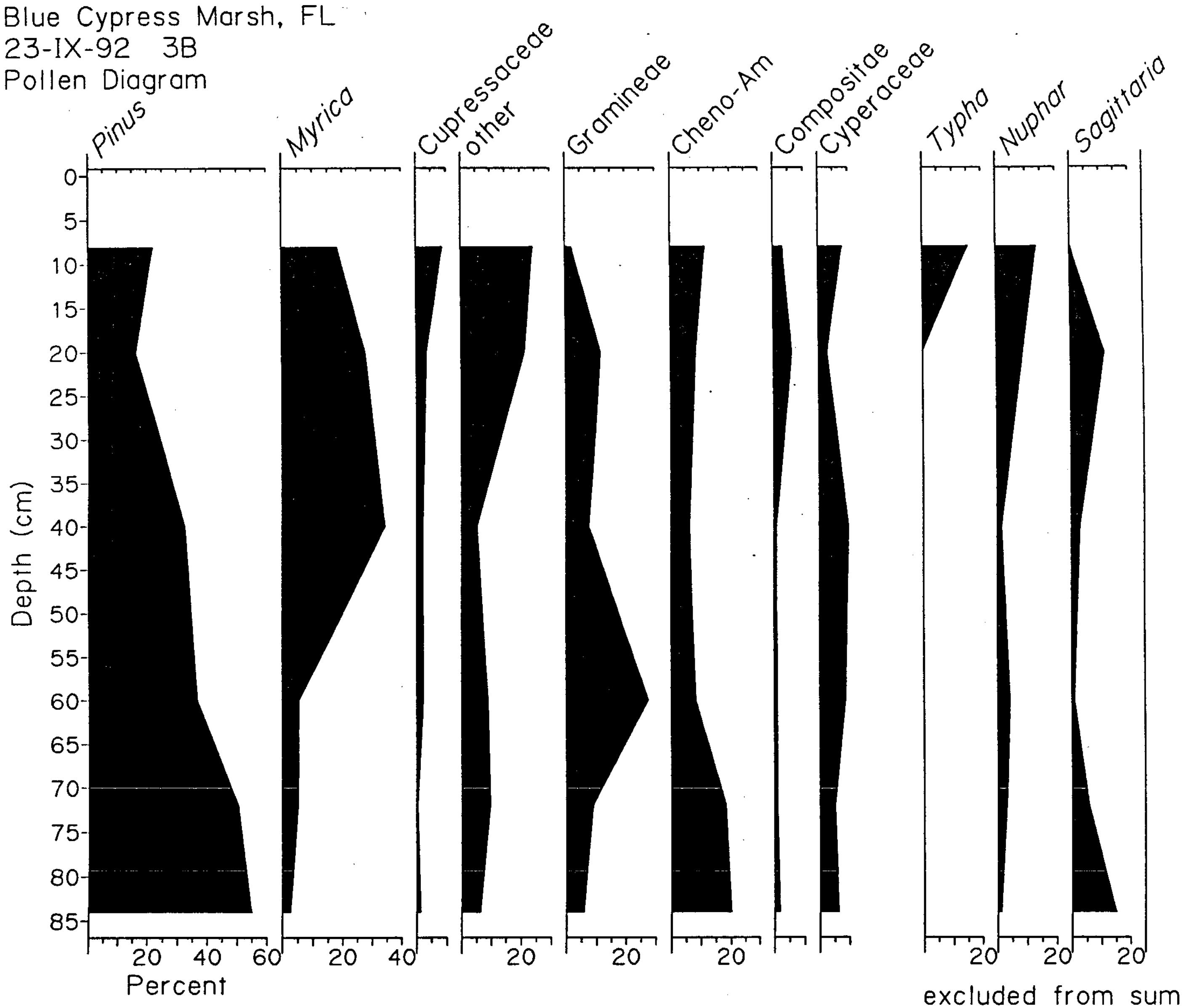


Figure 104. Relative abundance of pollen types in sediment from Blue Cypress Marsh core 3B.