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Professional Papers Series (Biology)

Number *three*

Nicholls State University
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November, 1978

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INTRODUCTION

Published hydrographic data from marine waters off Louisiana generally deal with the oceanic environment beyond the continental shelf (Thompson and Leming, 1978). The need to give adequate consideration to the shelf itself is emphasized by its vast fishery and mineral resources.

Most hydrographic reports on this vital region involve sporatic sampling over extensive areas or intensive sampling in limited areas. Some of the more valuable reports include Drummond and Austin, (1958). Drennan (1968), Rivas (1968), Murray (1976), Wiseman et al. (1976) and Thompson and Lemming (1978). The most extensive and intensive effort was that of Temple, Harrington and Martin (1977) whose sampling transects included 30 stations (7-73 m) on Louisiana's central and western shelves (Mississippi River to Sabine Pass). These workers profiled temperatures and salinities on a monthly basis from 1963 through 1965.

The data presented in this 1975-1976 study contributes to the existing hydrographic data base, and is unique in some respects. It exceeds the scope of previous efforts in covering a wider range of depth contours (6-110 m) in *all* geographical regions of the Louisiana Shelf, and includes oxygen as well as temperature and salinity data for surface and bottom waters.

MATERIALS AND METHODS

Hydrographic sampling was conducted along Transects A - H which cover the continental shelf off Louisiana (Fig. 1). Stations were located at 6, 12, 18, 24, 31, 37, 55, 73, 91 and 110 meters on every transect except E and H which lacked stations at the two deepest contours. Loran C and radar triangulation were employed to locate all 78 sites, whose coordinates appear in Table 1.

Temperature, salinity and dissolved oxygen were recorded at one meter above the bottom and one meter below the surface at each station. The Martek analyzer used for this purpose was calibrated at the beginning of each cruise.

Most transects were occupied four to six times between September, 1975 and August, 1976 (Table 1). Hydrographic data was taken in conjunction with an effort that was mainly designed to sample shrimp and fish (Ragan et al., 1978).

TEMPERATURE

The pattern for surface temperatures was basically similar at all sampling contours. An average minimum near 16 C was recorded in December or January, and a maximum near 30 C was obtained in July or August (Fig. 2). The pattern was strongly correlated with air temperatures although winds, currents and river discharges also influence water temperatures of this region (Temple, Harrington and Martin, 1977).

Bottom water temperatures approximated the aforementioned cycle at the 6 and 12 m stations but became progressively more stable with increasing depth (Fig. 2). The average range was 13 C at the shallowest stations (6 m) as compared to only 3 C at the deepest ones (110 m).

The largest differences between surface and bottom waters occurred beyond 12 m during late summer (Fig. 2). Bottom temperatures were actually dropping during this period. These observations coincide with those of Thompson and Lemming (1978) who attributed the variation to sustained solar heating of surface waters coupled with an abeyance of wind-induced mixing that is typical of late summer.

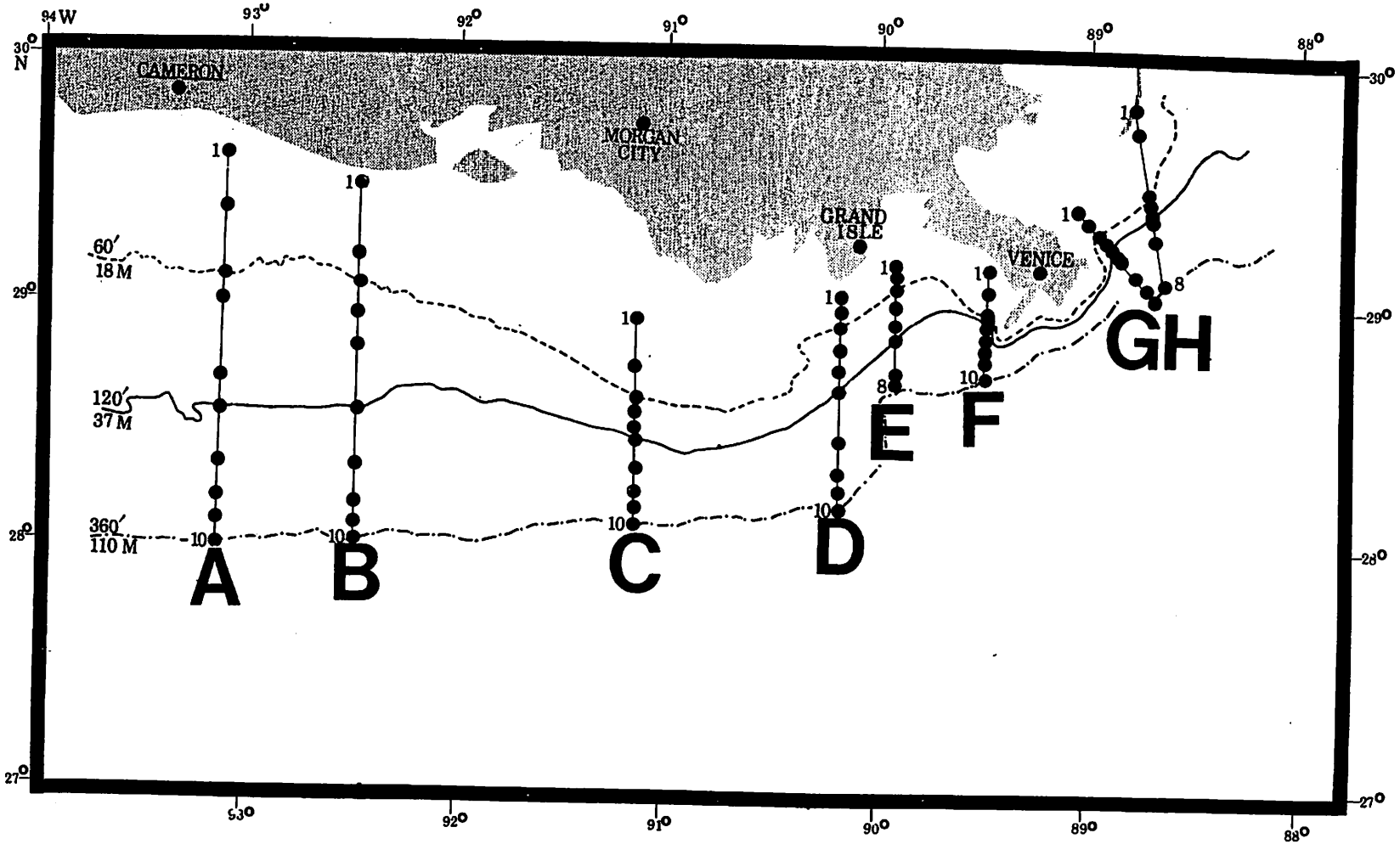

Figure 1. Transects and stations sampled on the Louisiana Shelf, 1975-76.

Transect-Sta.	Latitude	Longitude	Depth Ft.	Depth M.	1975 Sept.	1975 Oct.	1975 Nov.	1975 Dec.	1976 Jan.	1976 Feb.	1976 Mar.	1976 Apr.	1976 May	1976 Jn	1976 Jy	1976 Aug.
A-1	28°42'	93°08'	20	6		x		x				x				x
A-2	29°33'	93°09'	40	12		x		x				x		x		x
A-3	29°12'	93°07'	60	18		x		x				x		x		x
A-4	28°54'	93°08'	80	24		x		x				x		x		x
A-5	28°42'	93°10'	100	31		x		x				x		x		x
A-6	28°36'	93°10'	120	37		x		x				x		x		x
A-7	28°19'	93°08'	180	55		x		x				x		-		x
A-8	28°08'	93°07'	240	73		x		x				x		-		x
A-9	28°04'	93°07'	300	91		x		x				x		-		-
A-10	27°58'	93°10'	360	110		x		-				-		-		-
B-1	29°28'	92°23'	20	6		x		x				x		x		
B-2	29°12'	92°23'	40	12		x		x				x		x		
B-3	29°05'	92°23'	60	18		x		x				x		x		
B-4	28°58'	92°23'	80	24		x		x				x		x		
B-5	28°51'	92°23'	100	31		x		x				x		x		
B-6	28°33'	92°23'	120	37		x		x				x		x		
B-7	28°24'	92°23'	180	55		x		x				x		x		
B-8	29°16'	92°23'	240	73		x		x				x		x		x
B-9	28°05'	92°23'	300	91		x		x				x		x		x
B-10	28°02'	92°23'	360	110		x		x				x		x		x
C-1	28°55'	91°11'	20	6			x			x		x		x	x	
C-2	28°46'	91°11'	40	12			x			x		x		x	x	
C-3	28°40'	91°11'	60	18			x			x		x		x	x	
C-4	28°35'	91°11'	80	24			x			x		x		x	x	
C-5	28°33'	91°11'	100	31			x			x		x		x	x	
C-6	28°29'	91°11'	120	37			x			x		x		x	x	
C-7	28°22'	91°11'	180	55			x			x		x		x	x	
C-8	28°15'	91°11'	240	73			x			x		x		x	x	
C-9	28°10'	91°11'	300	91			x			x		x		x	x	
C-10	28°06'	91°11'	360	110			x			-		x		-	x	
D-1	29°03'	90°13'	20	6			x			x		x			x	
D-2	29°00'	90°13'	40	12			x			x		x			x	
D-3	28°55'	90°13'	60	18			x			x		x			x	
D-4	28°48'	90°13'	80	24			x			x		x			x	
D-5	28°45'	90°13'	100	31			x			x		x			x	
D-6	28°42'	90°13'	120	37			x			x		x			x	
D-7	28°27'	90°13'	180	55			x			x		x			x	
D-8	28°19'	90°13'	240	73			x			x		x			x	
D-9	28°16'	90°13'	300	91			x			x		x			x	
D-10	28°12'	90°13'	360	110			x			-		x				
E-1	29°14'	89°55'	20	6	x		x			x		x		x	x	
E-2	29°11'	89°55'	40	12	x		x			x		x		x	x	
E-3	29°07'	89°55'	60	18	x		x			x		x		x	x	
E-4	29°02'	89°55'	80	24	x		x			x		x		x	x	
E-5	28°58'	89°55'	100	31	x		x			x		x		x	x	
E-6	28°54'	89°55'	120	37	x		x			x		x		x	x	
E-7	28°44'	89°55'	180	55	x		x			x		x		x	x	
E-8	28°41'	89°55'	240	73	x		x			x		x		-	x	
F-1	29°11'	89°30'	20	6	x		x			x		x			x	x
F-2	29°01'	89°30'	40	12	x		x			x		x			x	x
F-3	28°59'	89°30'	60	18	x		x			x		x			x	x
F-4	28°58'	89°30'	80	24	x		x			x		x			x	x
F-5	28°57'	89°30'	100	31	x		x			x		x			x	x
F-6	28°55'	89°30'	120	37	x		x			x		x			x	x
F-7	28°51'	89°30'	180	55	x		x			x		x			x	x
F-8	28°49'	89°30'	240	73	x		x			x		x			x	x
F-9	28°42'	89°30'	300	91	x		x			x		x			x	-
F-10	28°39'	89°36'	360	110	x		x			-		x				
G-1	29°25'	89°05'	20	6		x		x		x					x	x
G-2	29°23'	89°02'	40	12		x		x		x					x	x
G-3	29°20'	88°59'	60	18		x		x		x					x	x
G-4	29°18'	88°57'	80	24		x		x		x					x	x
G-5	29°17'	88°55'	100	31		x		x		x					x	x
G-6	29°16'	88°54'	120	37		x		x		-					x	x
G-7	29°15'	88°52'	180	55		x		x		-					x	x
G-8	29°10'	88°47'	240	73		x		x		-					x	x
G-9	29°06'	88°43'	300	91		x		x		-					x	x
G-10	29°04'	88°41'	360	110		x		x		-						
H-1	29°49'	88°48'	20	6		x		x								x
H-2	29°43'	88°47'	40	12		x		x								x
H-3	29°29'	88°44'	60	18		x		x								x
H-4	29°27'	88°45'	80	24		x		x								x
H-5	29°26'	88°43'	100	31		x		x								x
H-6	29°25'	88°43'	120	37		x		x								x
H-7	29°21'	88°42'	180	55		x		x								x
H-8	29°12'	88°40'	240	73		x		x								x

TABLE 1. *Location, depth and sampling frequency for stations on the Louisiana Shelf, 1975-76.*

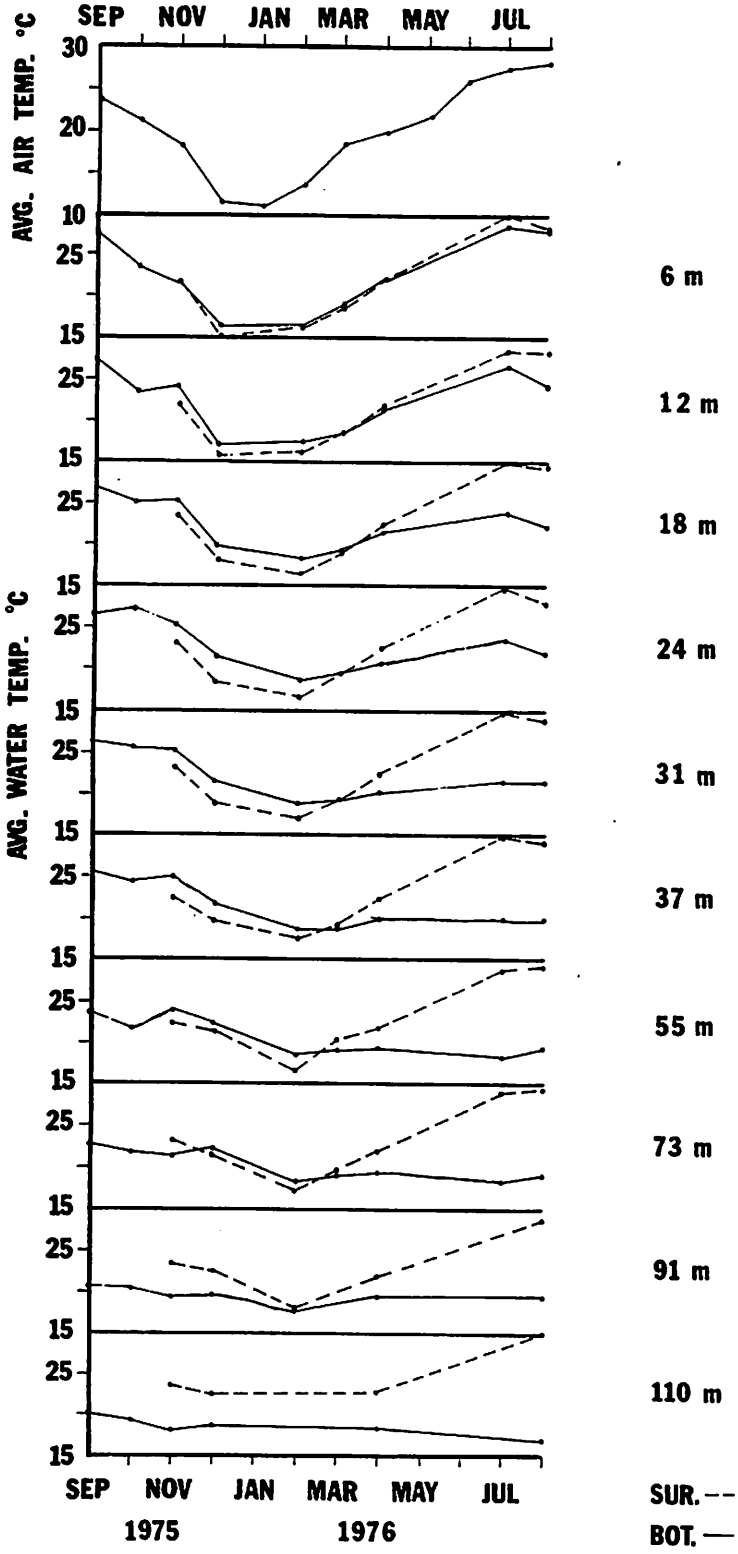

Figure 2. Average monthly temperatures of surface and bottom waters recorded at sampling depths on the Louisiana Shelf, 1975-76, as related to accompanying air temperatures.

The water column between 6-73 m appeared to reach an isothermal state around March (Fig. 2). A spring overturn has been reported in March for the Gulf Shelf (Jones, Copeland and Hoese, 1965). Even so, it would be an oversimplification to regard this as an overturn in the usual sense since heavy river discharges accompanying this period (Fig. 3) may have maintained stratification stability by introducing density gradients capable of resisting vertical mixing. Both temperature and salinity contribute to stratification in this area (Wiseman *et al.*, 1975).

SALINITY

The low salinities that characterize Louisiana's offshore environment result from a heavy influx of stream flow, 90% of which is contributed by the Mississippi and Atchafalaya Rivers (Gaidry and White, 1973). Discharge rates of these rivers were obtained from the U.S. Army Corps of Engineers (1969-1978), and the sum of their mean flows was plotted for each of our sampling months in Figure 3. This pattern is presented in relation to that of salinity means observed on the Louisiana Shelf. The figure shows that salinity varied widely on the various contours. The relationship between surface salinities and river discharge was generally inverse at the nearshore stations (6-31 m). The interrelationship may have been more sharply defined had there not been gaps in our sampling frequency. Salinity observations were not available for January, June and July, whereas river discharge rates were plotted for the 12 consecutive months (Figure 3). Nevertheless, surface and bottom salinities rose as discharge rates fell during February, and dropped during the outflow peak in March at the shallower contours (6-31m). Readings were closer and somewhat higher at the deeper stations (37 - 110 m).

Our observations may often exceed average values as river discharge was generally subnormal during our sampling interval (Figure 4). River outfall was substantially below the ten year mean during December, February, April, May and June.

OXYGEN

Oxygen was comparatively high in surface waters (Fig. 5) where it is acquired from the atmosphere and from photosynthesis of phytoplankton (Raymont, 1963). Peak values were recorded in March when river discharges were highest. This may reflect an upsurge in phytoplankton production induced by the fertilizing effects of river waters. Photosynthetic activity may have been

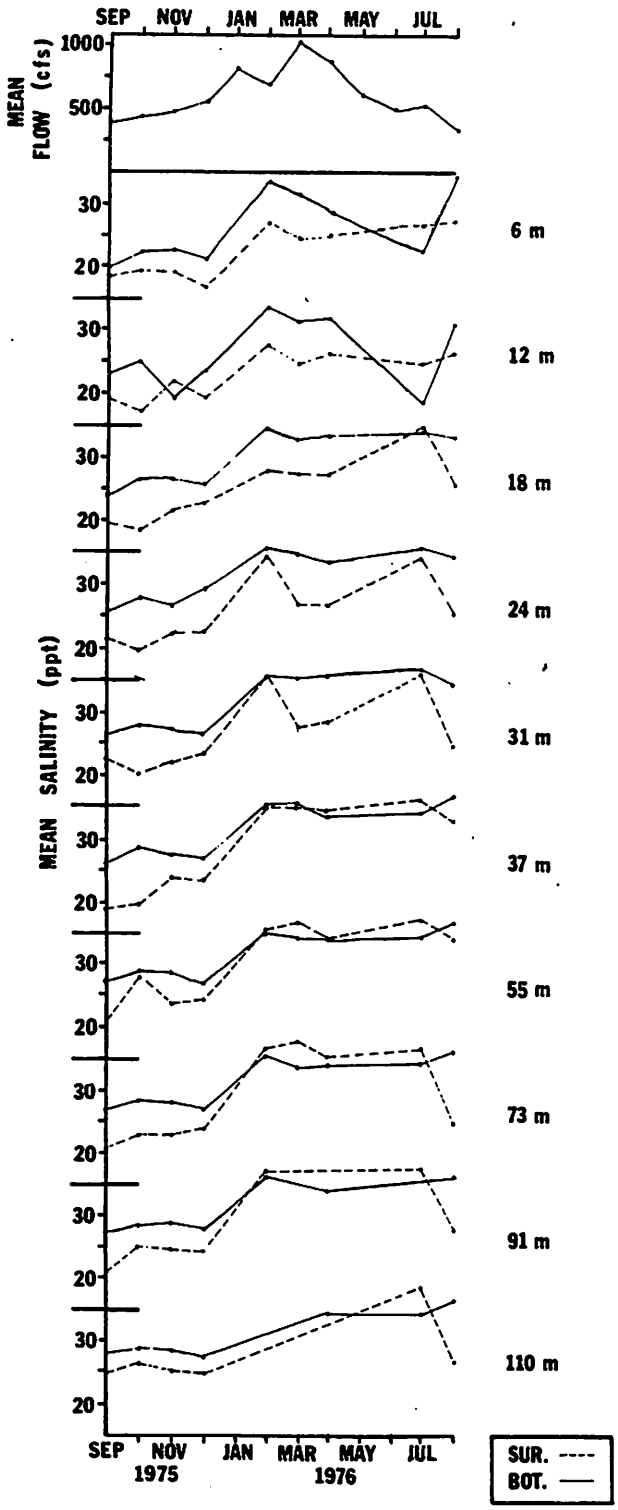

Figure 3. Average monthly salinities of surface and bottom waters recorded at sampling depths on the Louisiana Shelf, 1975-76, as related to the sum of the flow means for the Mississippi and Atchafalaya Rivers.

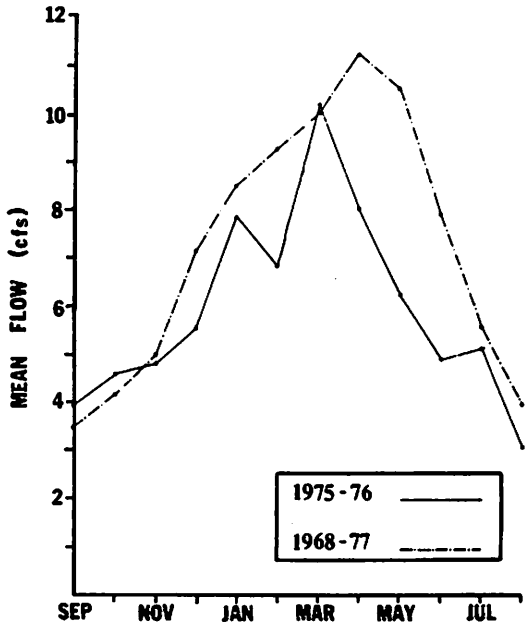

Figure 4. Sum of mean flows of the Mississippi and Atchafalaya Rivers during the sampling months of 1975-76, as compared to those of a ten year mean.

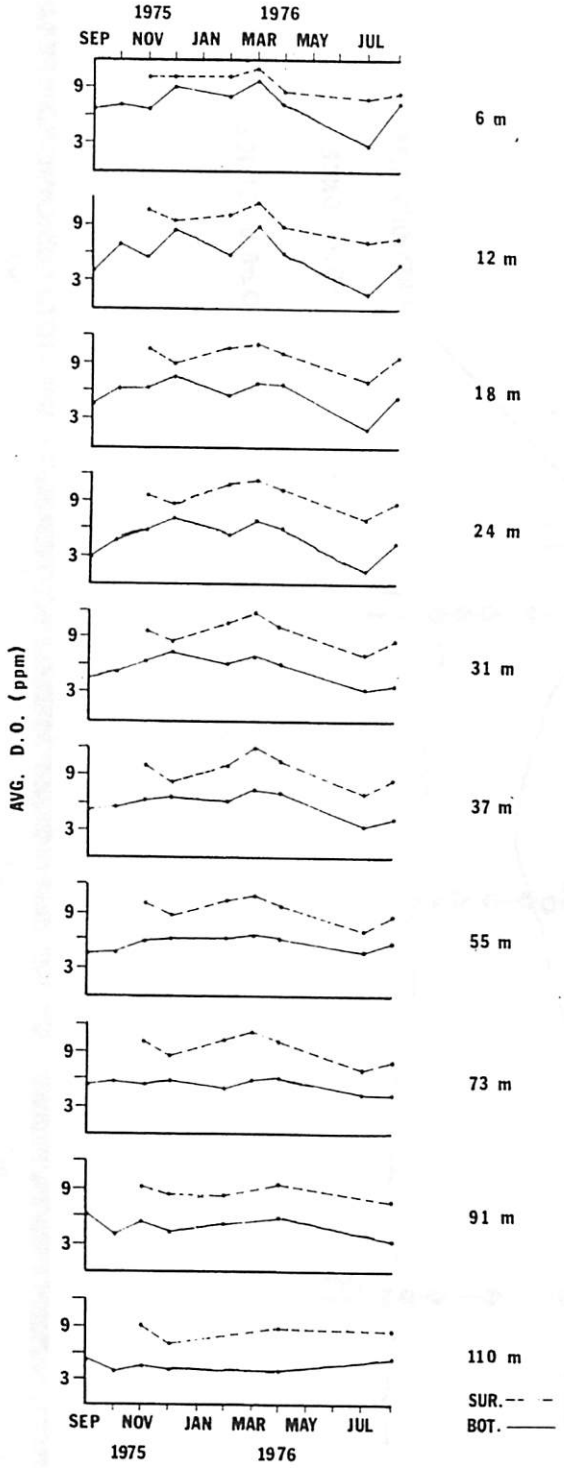

Figure 5. Average monthly concentrations of dissolved oxygen in surface and bottom waters recorded at sampling depths on the Louisiana Shelf, 1975-76.

enhanced by the accompanying increases in surface temperatures (Fig. 5) and photoperiod.

A concurrent rise in the oxygen content of bottom waters during March coincides with an apparent breakdown of thermal resistance (Figures 2 and 5). These observations suggest that vertical mixing was significant during this period. Appreciable mixing may also have occurred in December when oxygen values of surface and bottom waters tended to converge at the shallower contours (Fig. 5). Common during this season are winter storms called "northers" which are capable of disrupting stratification (Thompson and Lemming, 1978), and Figure 2 indicates that thermal resistance was weak in December.

It is noteworthy that dissolved oxygen in bottom waters frequently fell below 2 p.p.m. on what is predominantly the central Louisiana Shelf (Fig. 6). Most of these minimal values were recorded during the warmer months in depths of 12 to 31 m. July averages of 1.7 and 1.3 occurred at 18 and 24 m, respectively.

The foregoing observations are best understood when interpreted in the light of published accounts (Flowers, Miller and Gann, 1975; Harris, Ragan and Kilgen, 1976; Harris, Ragan and Green, 1978) that deal with the history of oxygen-deficient waters in this region. The phenomenon was first observed in May, 1973 when an NSU research team discovered bottom waters containing little or no oxygen on the State's central shelf (Fig. 6). The waters comprised a layer 2 - 7 m thick on contours ranging from 6 - 33 m. The condition persisted during the sampling program (May, 1973 through March, 1974), and covered between 27% (December) and 93% (July) of the sampling complex. The average was 52% for the 14 month period, and slightly over half of these minimal readings were anoxic (0.0). Temperature and salinity characteristics of the waters involved were similar to those of adjacent bottom waters with normal oxygen regimes. Trawling in the affected areas yielded few to no freely-mobile organisms (Ragan, 1975; Ragan and Harris, 1975).

A subsequent study conducted from May, 1974 through August, 1975 revealed an incidence of 39% - a reduction of 13% from the previous sampling interval. Less than one third of these readings were anoxic (Harris *et al.*, 1976).

The incidence of oxygen-deficient waters (<2 p.p.m.) in the presently expanded program was 7% shelfwide, and 12% for those stations falling within the limits of the previous sampling complex (Fig. 6). In contrast to the

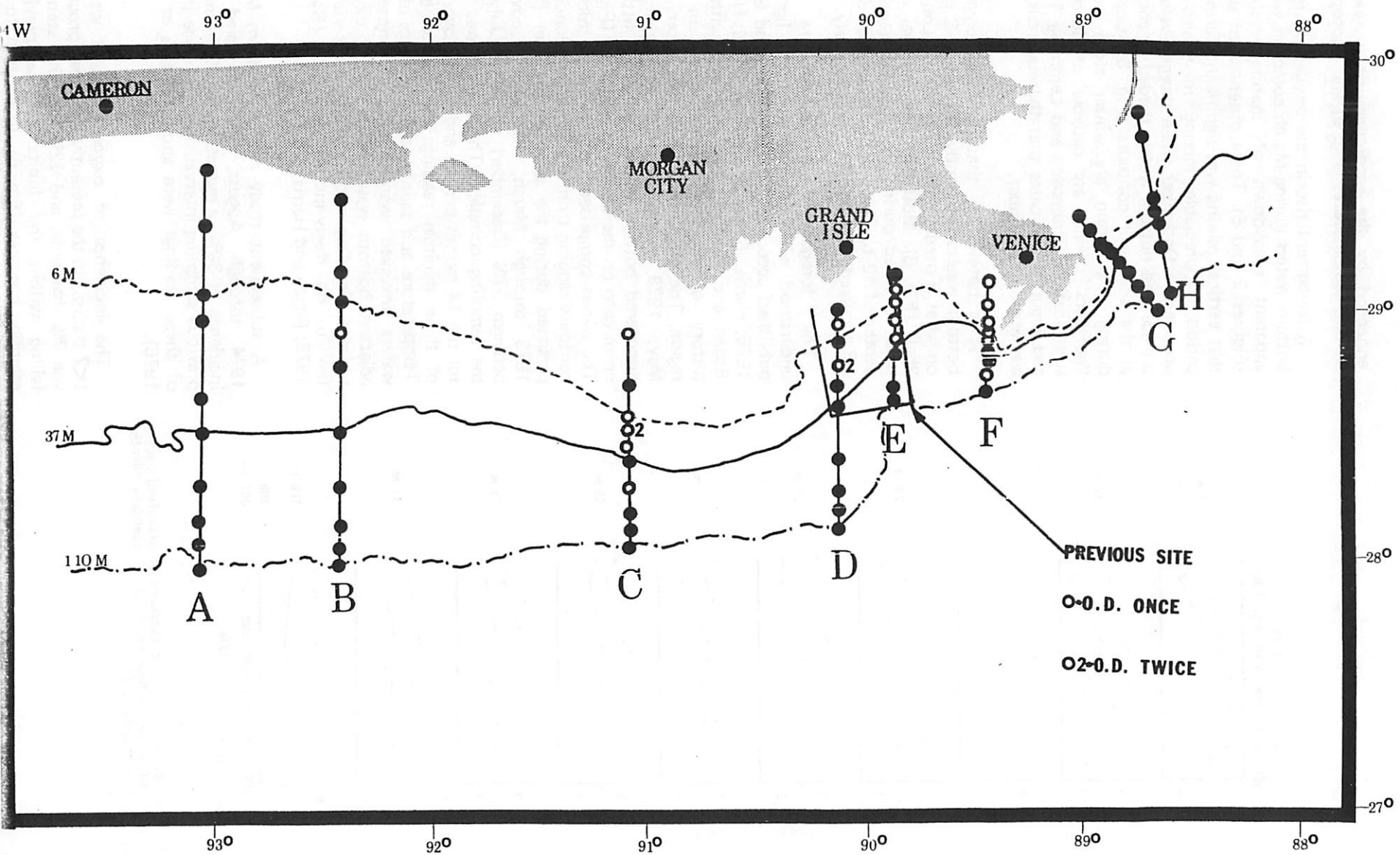

Figure 6. Map of current sampling sites using white circles to identify stations at which oxygen-deficient (O.D.) readings were recorded.

previous studies, no anoxic values were recorded (Tables 2-9). Oxygen-deficient readings were confined to areas west of the Mississippi River Delta.

The apparent reduction in the extent and intensity of the phenomenon from 1973 - 1976 was accompanied by a decline in the volume of river discharges. Outflows diminished from a record level in 1973 to a point well below the longterm mean in 1976 (Harris *et al.*, 1978). These workers also found a direct correlation between discharge rates and the incidence of oxygen-deficient readings on a monthy basis.

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TABLE 2. Surface and bottom readings for temperature, salinity and dissolved oxygen at stations on Transect A.

STATION: A-1 DEPTH: 6 m LATITUDE: 28°42' LONGITUDE: 93 08'

Month	Day	Year (19-)	Temp (C)	salinity (ppt)	D.O. (ppm)
10	08	75	22.5	20.8	08.1
			22.0	20.8	07.5
12	02	75	14.3	16.0	11.2
			15.0	18.5	11.2
04	01	76	19.0	23.0	08.8
			20.0	29.4	07.5

STATION: A-2 DEPTH: 12 m LATITUDE: 29°33' LONGITUDE: 93 09'

10	08	75	23.0	22.0	07.9
			23.3	22.3	06.6
12	06	75	15.0	20.2	09.2
			15.6	21.6	09.2
04	01	76	19.5	23.8	09.2
			19.8	32.2	08.4

STATION: A-3 DEPTH: 18 m LATITUDE: 29°33' LONGITUDE: 93 09'

10	08	75	24.8	22.9	08.8
			23.7	23.7	05.8
12	06	75	19.5	24.6	08.7
			19.1	26.1	08.0
04	01	76	20.0	32.0	10.0
			20.0	32.0	09.4

STATION: A-4 DEPTH: 24 m LATITUDE: 28°54' LONGITUDE: 93 08'

10	08	75	25.2	23.3	08.4
			25.3	27.2	05.9
12	06	75	20.5	26.2	08.2
			20.5	38.0	06.4
04	01	76	20.0	35.3	09.8
			19.3	34.0	09.3

STATION: A-5 DEPTH: 31 m LATITUDE: 28°42' LONGITUDE: 93 10'

10	08	75	25.3	23.9	08.8
			25.3	27.6	05.3
12	06	75	20.8	23.9	08.0
			21.0	26.8	07.9
04	01	76	19.7	34.0	09.6
			19.3	34.0	09.4

Table 2. (cont.)

STATION: A-6 DEPTH: 37 m LATITUDE: 28°36' LONGITUDE: 93 10'

Month	Day	Year (19-)	Temp (C)	salinity (ppt)	D.O. (ppm)
10	08	75	25.4	25.2	08.5
			25.0	28.1	03.6
12	06	75	20.0	23.8	08.0
			21.0	27.7	07.6
04	01	76	19.8	34.0	10.2
			19.4	34.0	09.4

STATION: A-7 DEPTH: 55 m LATITUDE: 28°19' LONGITUDE: 93 08'

10	09	75	25.0	33.7	09.2
			21.5	28.9	03.6
12	06	75	22.5	21.4	07.5
			22.6	26.8	07.4
04	01	76	19.5	34.1	09.8
			17.5	34.8	07.7

STATION: A-8 DEPTH: 73 m LATITUDE: 28°08' LONGITUDE: 93 07'

10	09	75	25.2	25.5	08.4
			21.8	28.3	05.6
12	07	75	22.5	21.4	07.6
			22.6	27.0	07.3
04	02	76	20.0	31.4	09.4
			17.5	34.6	06.7

STATION: A-9 DEPTH: 91 m LATITUDE: 28°04' LONGITUDE: 93 07'

10	09	75	25.7	25.5	08.8
			21.0	28.0	03.0
12	07	75	22.7	21.5	07.5
			20.0	28.6	04.0
04	02	76	20.0	33.5	09.5
			17.2	34.5	06.5

STATION: A-10 DEPTH: 110 m LATITUDE: 27°58' LONGITUDE: 93 10'

10	09	75	25.6	25.9	08.6
			19.3	28.2	04.8
12	07	75	-	-	-
			-	-	-
04	02	76	-	-	-
			-	-	-

TABLE 3. Surface and bottom readings for temperature, salinity and dissolved oxygen at stations on Transect B.

STATION: B-1 DEPTH: 6m LATITUDE: 29° 20' LONGITUDE: 92° 23'

Month	Day	Year (19-)	Temp (C)	salinity (ppt)	D.O. (ppm)
10	10	75	25.7	16.6	08.7
			23.5	20.4	03.9
12	8	75	14.2	13.8	09.5
			16.0	21.4	05.8
04	3	76	21.0	26.6	10.0
			20.5	29.6	08.7

STATION: B-2 DEPTH: 12m LATITUDE: 29° 12' LONGITUDE: 92° 23'

10	10	75	25.3	18.4	10.0
			25.0	23.4	06.2
12	8	75	16.2	19.4	08.9
			18.8	23.5	07.2
04	3	76	20.0	28.8	09.4
			20.0	32.0	07.6

STATION: B-3 DEPTH: 18m LATITUDE: 29° 05' LONGITUDE: 92° 23'

10	10	75	25.4	19.0	09.8
			25.5	25.2	05.2
12	8	75	17.5	23.2	08.7
			19.2	24.8	06.8
04	3	76	20.0	29.6	10.4
			19.6	32.4	07.2

STATION: B-4 DEPTH: 24m LATITUDE: 28° 58' LONGITUDE: 92° 23'

10	10	75	25.3	27.2	09.1
			26.5	27.3	01.8
12	8	75	19.3	22.0	07.6
			21.4	25.2	07.0
04	3	76	20.0	29.0	10.2
			20.0	34.4	08.0

STATION: B-5 DEPTH: 31m LATITUDE: 28° 51' LONGITUDE: 92° 23'

10	10	75	25.2	27.4	08.5
			26.6	27.3	02.5
12	8	75	20.0	27.4	07.2
			22.0	27.8	06.9
04	3	76	19.7	32.8	09.8
			19.0	34.2	08.2

TABLE 3. (cont.)

STATION: B-6 DEPTH: 37m LATITUDE: 28° 33' LONGITUDE: 92° 23'

Month	Day	Year (19-)	Temp (C)	salinity (ppt)	D.O. (ppm)
10	10	75	26.4	27.4	09.4
			25.4	28.2	08.6
12	8	75	21.5	24.6	07.2
			22.0	26.3	06.9
04	3	76	19.5	30.2	10.0
			19.2	34.4	09.2

STATION: B-7 DEPTH: 55m LATITUDE: 28° 24' LONGITUDE: 92° 23'

10	10	75	26.0	28.4	09.4
			22.6	28.6	05.2
12	7	75	22.0	25.8	07.4
			22.0	26.7	07.4
04	2	76	20.0	30.5	10.0
			18.8	34.8	08.2

STATION: B-8 DEPTH: 73m LATITUDE: 29° 16' LONGITUDE: 92° 23'

10	9	75	26.5	26.7	08.0
			22.5	28.7	05.4
12	7	75	22.5	25.6	08.1
			22.7	27.8	07.0
04	2	76	20.3	34.1	10.4
			18.8	34.8	06.2

STATION: B-9 DEPTH: 91m LATITUDE: 28° 05' LONGITUDE: 92° 23'

10	9	75	26.7	27.8	09.2
			20.3	28.4	03.9
12	7	75	22.5	25.8	08.1
			20.3	28.4	04.4
04	2	76	21.0	30.5	10.2
			18.7	34.5	05.5

STATION: B-10 DEPTH: 110m LATITUDE: 28° 02' LONGITUDE: 92° 23'

10	9	75	26.5	27.8	08.8
			19.6	28.6	03.2
12	7	75	22.8	27.8	07.4
			18.7	26.8	04.0
04	2	76	21.0	34.0	09.0
			18.0	34.5	02.8

TABLE 4. Surface and bottom readings for temperature, salinity and dissolved oxygen at stations on Transect C.

STATION: C-1 DEPTH: 6m LATITUDE: 28° 55' LONGITUDE: 91° 11'

Month	Day	Year (19-)	Temp (C)	Salinity (ppt)	D.O. (ppm)
09	11	75	29.0	15.7	6.7
			29.0	16.4	6.7
11	08	75	24.8	23.0	8.8
			24.8	23.1	8.7
02	04	76	14.4	23.6	12.8
			14.0	-	9.8
04	29	76	23.8	24.6	9.1
			23.5	25.4	8.6
07	21	76	31.0	-	6.8
			28.0	22.3	1.4

STATION: C-2 DEPTH: 12m LATITUDE: 28° 46' LONGITUDE: 91° 11'

Month	Day	Year (19-)	Temp (C)	Salinity (ppt)	D.O. (ppm)
09	11	75	29.0	19.1	6.5
			29.0	19.7	3.2
11	08	75	25.0	36.2	9.0
			25.0	36.2	7.8
02	04	76	14.6	26.0	11.6
			15.7	39.0	7.5
04	29	76	23.0	27.1	7.1
			22.5	31.0	6.0
07	21	76	27.0	18.3	6.0
			31.0	18.3	3.2

STATION: C-3 DEPTH: 18m LATITUDE: 28°40' LONGITUDE: 91° 11'

Month	Day	Year (19-)	Temp (C)	Salinity (ppt)	D.O. (ppm)
09	11	75	29.0	21.4	7.2
			29.0	21.4	6.9
11	08	75	25.0	26.1	
			24.8	37.5	
02	04	76	14.2	27.3	11.2
			17.0	-	7.8
04	29	76	22.3	31.7	7.8
			22.5	32.6	6.6
07	21	76	31.0	-	6.6
			22.0	31.2	1.2

STATION: C-4 DEPTH: 24m LATITUDE: 28° 35' LONGITUDE: 91° 11'

Month	Day	Year (19-)	Temp (C)	Salinity (ppt)	D.O. (ppm)
09	11	75	29.5	21.4	6.7
			28.5	24.9	0.8
11	08	75	25.8	27.2	7.9
			25.5	28.1	7.6
02	04	76	14.0	27.3	11.0
			18.2	-	7.4
04	29	76	22.5	34.0	8.8
			21.6	34.0	6.2
07	21	76	30.0	22.2	6.8
			24.0	36.8	0.6

TABLE 4. (*cont.*)

STATION: C-5 DEPTH: 31m LATITUDE: 28° 33' LONGITUDE: 91° 11'

Month	Day	Year (19-)	Temp (C)	Salinity (ppt)	D.O. (ppm)
09	11	75	29.7	21.3	6.5
			24.0	26.2	1.4
11	08	75	25.5	27.7	8.4
			25.3	28.2	6.6
02	04	76	15.0	30.4	10.4
			18.5	-	7.5
04	29	76	22.0	-	9.1
			21.0	33.6	5.2
07	21	76	30.0	-	7.0
			21.5	36.6	3.0

STATION: C-6 DEPTH: 37m LATITUDE: 28° 29' LONGITUDE: 91° 11'

09	11	75	29.5	17.4	6.1
			23.5	25.8	4.1
11	08	75	25.5	28.4	9.0
			25.5	28.5	7.8
02	04	76	16.0	-	10.2
			18.7	-	7.6
04	29	76	22.0	35.3	9.0
			20.3	33.8	7.2

STATION: C-7 DEPTH: 55m LATITUDE: 28° 22' LONGITUDE: 91° 11'

09	11	75	29.3	22.5	6.1
			23.0	26.1	0.7
11	08	75	25.5	28.4	8.4
			25.6	29.7	7.7
02	04	76	16.7	34.0	9.8
			18.7	-	6.7
04	29	76	22.5	32.9	9.4
			20.0	34.4	7.0

STATION: C-8 DEPTH: 73m LATITUDE: 28° 15' LONGITUDE: 91° 11'

09	12	75	29.0	21.6	8.8
			22.0	26.7	5.6
11	08	75	25.4	28.3	9.0
			23.2	29.6	6.6
02	04	76	18.3	35.0	9.5
			17.8	-	4.8
04	29	76	22.5	32.3	9.2
			19.4	34.4	3.4

TABLE 4 (cont.)

STATION: C-9 DEPTH: 91m LATITUDE: 28° 10' LONGITUDE: 91° 11'

Month	Day	Year (19-)	Temp (C)	Salinity (ppt)	D.O. (ppm)
09	12	75	29.0	22.5	8.8
			21.0	26.4	7.3
11	09	75	24.0	28.8	9.0
			21.0	29.6	5.8
02	03	76	19.0	33.4	7.8
			17.6	-	5.0
04	29	76	23.0	34.0	8.5
			18.8	34.6	5.5

STATION: C-10 DEPTH: 110m LATITUDE: 28° 06' LONGITUDE: 91° 11'

09	12	75	28.8	23.9	8.6
			19.8	27.1	6.9
11	09	75	25.0	28.3	8.8
			19.8	27.9	4.6
04	28	76	23.0	33.8	8.8
			18.0	34.8	5.4

TABLE 5. Surface and bottom readings for temperature, salinity and dissolved oxygen at stations on Transect D.

STATION: D-1 DEPTH: 6m LATITUDE: 29° 03' LONGITUDE: 90° 13'

Month	Day	Year (19-)	Temp (C)	Salinity (ppt)	D.O. (ppm)
09	13	75	29.1	17.5	8.2
			29.1	17.0	9.0
11	05	75	24.0	18.0	9.5
			24.2	20.4	7.9
01	31	76	14.2	28.8	10.0
			15.3	-	7.6
04	22	76	22.8	28.0	7.3
			21.8	30.8	6.1
07	20	76	30.0	27.5	9.0
			29.0	-	3.5

STATION: D-2 DEPTH: 12m LATITUDE: 29° 00' LONGITUDE: 90° 13'

09	13	75	29.3	16.7	9.4
			27.0	24.4	1.1
11	05	75	24.2	12.2	10.2
			24.7	24.3	5.0
01	31	76	14.2	29.1	12.8
			18.4	-	4.6
04	22	76	23.5	26.0	10.6
			21.6	30.5	6.4
07	20	76	30.0	27.7	8.8
			28.0	-	2.1

STATION: D-3 DEPTH: 18m LATITUDE: 28° 55' LONGITUDE: 90° 13'

09	13	75	29.1	18.8	8.8
			26.5	25.3	0.8
11	05	75	24.0	21.4	10.0
			25.5	26.7	6.1
01	31	76	15.5	30.1	13.2
			18.0	-	5.3
04	22	76	24.0	26.6	11.0
			21.6	35.4	7.4
07	20	76	30.0	31.6	6.8
			25.0	36.6	3.4

STATION: D-4 DEPTH: 24m LATITUDE: 28° 48' LONGITUDE: 90° 13'

09	13	75	29.3	22.9	8.6
			26.0	26.0	1.9
11	07	75	25.4	23.2	7.8
			25.5	27.1	4.4
01	31	76	15.5	31.0	14.0
			19.0	-	5.4
04	22	76	24.2	28.4	10.8
			20.8	31.6	3.8
07	20	76	30.0	32.0	6.8
			23.5	36.6	1.4

TABLE 5. (cont.)

STATION: D-5 DEPTH: 31m LATITUDE: 28° 45' LONGITUDE: 90° 13'

Month	Day	Year (19-)	Temp (C)	Salinity (ppt)	D.O. (ppm)
09	13	75	29.3	24.2	8.4
			25.5	27.6	5.1
11	07	75	24.5	23.5	9.2
			25.5	28.1	7.3
01	31	76	16.0	31.0	13.5
			18.5	-	6.1
04	22	76	24.5	26.1	11.2
			20.0	33.6	5.6
07	20	76	30.0	32.0	7.2
			22.0	38.2	5.0

STATION: D-6 DEPTH: 37m LATITUDE: 28° 42' LONGITUDE: 90° 13'

09	13	75	29.2	20.9	8.2
			24.0	26.9	4.4
11	07	75	25.3	25.7	9.0
			25.3	28.2	6.6
02	09	76	18.3	31.5	11.0
			18.5	-	5.4
04	22	76	24.7	24.2	11.6
			20.0	33.6	5.0

STATION: D-7 DEPTH: 55m LATITUDE: 28° 27' LONGITUDE: 90° 13'

09	13	75	29.5	21.4	8.0
			22.7	27.0	6.6
11	07	75	25.0	27.0	9.2
			24.6	28.8	5.6
02	09	76	17.0	31.5	10.8
			18.7	-	5.6
04	22	76	23.0	30.3	9.2
			19.4	33.4	2.8

STATION: D-8 DEPTH: 73m LATITUDE: 28° 19' LONGITUDE: 90° 13'

09	12	75	29.5	20.8	8.3
			22.0	26.7	5.4
11	07	75	25.0	26.8	9.0
			23.0	29.2	5.5
02	09	76	16.3	30.2	11.1
			17.7	-	4.9
04	23	76	22.8	32.5	9.2
			19.5	34.0	6.6

TABLE 5. (cont.)

STATION: D-9 DEPTH: 91 m LATITUDE: 28° 16' LONGITUDE: 90° 13'

Month	Day	Year (19-)	Temp (C)	Salinity (ppt)	D.O. (ppm)
09	12	75	29.1	20.5	7.7
			21.0	27.7	6.6
11	08	75	25.0	26.7	9.2
			21.5	29.3	4.7
02	09	76	16.5	30.6	11.0
			16.8	-	5.3
04	23	76	22.5	32.9	9.4
			19.0	33.6	6.3

STATION: D-10 DEPTH: 110m LATITUDE: 28° 12' LONGITUDE: 90° 13'

Month	Day	Year (19-)	Temp (C)	Salinity (ppt)	D.O. (ppm)
09	12	75	30.0	28.7	8.0
			20.2	28.3	6.7
11	07	74	24.0	27.3	9.2
			20.0	29.4	4.7
04	23	76	22.7	32.7	9.1
			18.5	33.8	3.7

TABLE 6. Surface and bottom readings for temperature, salinity and dissolved oxygen at stations on Transect E.

STATION: E-1 DEPTH: 6m LATITUDE: 29° 14' LONGITUDE: 89° 55'

Month	Day	Year (19-)	Temp (C)	Salinity (ppt)	D.O. (ppm)
09	25	75	23.5	18.2	7.2
			27.3	22.0	5.3
11	15	75	16.6	13.0	10.0
			24.0	23.4	03.6
02	23	76	15.5	25.6	08.4
			16.8	32.0	06.5
04	28	76	23.3	23.5	09.4
			23.5	23.0	08.8
07	24	76	31.0	25.2	07.1
			29.0	-	03.5

STATION: E-2 DEPTH: 12m LATITUDE: 29° 11' LONGITUDE: 89° 55'

09	25	75	24.6	18.5	06.9
			27.0	23.4	06.1
11	15	75	19.0	19.9	12.0
			25.4	25.4	03.6
02	23	76	17.0	28.8	09.2
			18.2	33.4	03.9
04	28	76	23.0	23.8	08.5
			22.0	30.6	04.0
07	24	76	31.0	27.9	07.2
			26.5	-	00.8

STATION: E-3 DEPTH: 18m LATITUDE: 29° 07' LONGITUDE: 89° 55'

09	25	75	25.3	18.1	07.8
			27.2	24.6	03.6
11	15	75	21.5	17.7	11.6
			25.5	25.3	04.8
02	17	76	17.3	28.0	11.6
			18.3	32.8	02.2
04	28	76	23.0	22.2	10.0
			21.0	32.4	04.4
07	24	76	31.0	28.2	07.2
			25.0	34.8	00.5

STATION: E-4 DEPTH: 24m LATITUDE: 29° 02' LONGITUDE: 89° 55'

09	25	75	25.5	18.5	08.4
			27.0	25.6	03.4
11	15	75	21.1	18.6	12.4
			25.5	26.7	04.9
02	17	76	17.0	28.8	12.2
			19.0	34.4	03.2
04	28	76	23.0	23.1	09.6
			20.5	33.0	02.8
07	24	76	30.0	32.3	07.2
			23.0	36.5	01.8

TABLE 6. (cont.)

STATION: E-5 DEPTH: 31m LATITUDE: 28° 58' LONGITUDE: 89° 55'

Month	Day	Year (19-)	Temp (C)	Salinity (ppt)	D.O. (ppm)
09	25	75	26.0	23.9	08.4
			28.0	26.2	06.0
11	15	75	21.3	17.7	10.1
			25.0	26.2	05.8
02	17	76	17.5	29.1	11.8
			19.0	34.6	05.9
04	28	76	22.7	25.8	09.0
			20.0	33.6	02.2
07	24	76	30.0	31.0	06.8
			21.0	36.0	02.0

STATION: E-6 DEPTH: 37m LATITUDE: 28° 54' LONGITUDE: 89° 55'

Month	Day	Year (19-)	Temp (C)	Salinity (ppt)	D.O. (ppm)
09	25	75	25.4	17.9	08.2
			27.0	24.7	05.9
11	15	75	21.8	18.2	10.5
			25.0	27.0	05.3
02	17	76	17.8	29.4	11.6
			18.9	34.6	05.8
04	26	76	24.0	23.2	09.8
			20.3	33.0	05.8
07	24	76	30.0	31.1	06.8
			20.0	34.2	03.4

STATION: E-7 DEPTH: 55m LATITUDE: 28° 44' LONGITUDE: 89° 55'

Month	Day	Year (19-)	Temp (C)	Salinity (ppt)	D.O. (ppm)
09	25	75	25.0	20.2	08.1
			26.4	26.6	05.9
11	15	75	21.5	20.1	10.0
			22.5	26.8	05.1
02	16	76	18.0	31.6	11.8
			18.0	34.0	06.6
04	27	76	25.0	27.0	09.2
			20.0	34.4	06.8
07	25	76	29.0	32.3	07.0
			18.0	34.5	04.6

STATION: E-8 DEPTH: 73m LATITUDE: 28° 41' LONGITUDE: 89° 55'

Month	Day	Year (19-)	Temp (C)	Salinity (ppt)	D.O. (ppm)
09	26	75	24.7	19.2	07.8
			25.5	26.7	05.3
11	15	75	21.3	20.5	10.2
			18.5	27.4	04.8
02	16	76	18.0	31.3	11.6
			18.0	35.2	04.8
04	27	76	23.0	29.9	10.4
			20.0	33.8	07.1
07	25	76	29.0	31.8	06.8
			18.0	34.5	04.2

TABLE 7. Surface and bottom readings for temperature, salinity and dissolved oxygen at stations on Transect F.

STATION: F-1 DEPTH: 6m LATITUDE: 29° 11' LONGITUDE: 89° 30'

Month	Day	Year (19-)	Temp (C)	Salinity (ppt)	D.O. (ppm)
09	26	75	25.0	20.7	5.6
			25.0	22.0	5.1
11	16	75	19.8	19.4	11.6
			22.0	23.7	6.2
02	23	76	17.4	27.6	8.2
			17.6	36.0	6.9
04	27	76	23.0	23.5	7.4
			21.0	32.0	0.8
08	06	76	29.0	27.7	8.4
			18.0	34.5	5.3

STATION: F-2 DEPTH: 12m LATITUDE: 29° 01' LONGITUDE: 89° 30'

09	25	75	25.0	23.0	8.0
			26.5	24.7	6.4
11	16	75	20.5	19.9	10.8
			24.2	24.7	5.6
02	23	76	17.7	28.2	7.8
			19.8	34.2	6.2
04	27	76	24.0	23.2	8.8
			20.8	31.6	3.8
08	06	76	30.0	26.0	7.4
			27.0		1.8

STATION: F-3 DEPTH: 18m LATITUDE: 28° 59' LONGITUDE: 89° 30'

09	26	75	24.0	20.4	8.2
			27.4	24.5	5.8
11	16	75	20.5	19.1	11.6
			24.5	24.4	6.1
02	23	76	17.8	28.0	8.5
			18.8	36.3	6.1
04	27	76	24.0	20.4	9.3
			20.8	32.8	4.7
08	06	76	29.5	26.2	7.6
			25.0	34.8	1.8

STATION: F-4 DEPTH: 24m LATITUDE: 29° 58' LONGITUDE: 89° 30'

09	26	75	25.0	21.3	7.1
			27.3	24.8	5.0
11	16	75	20.3	17.5	10.2
			24.3	23.8	6.0
02	23	76	17.4	31.6	8.3
			18.9	35.8	6.5
04	27	76	24.2	19.0	12.2
			21.0	32.8	4.8
08	06	76	29.0	27.0	7.8
			23.5	36.8	1.0

TABLE 7. (cont.)

STATION: F-5 DEPTH: 31m LATITUDE: 28° 57' LONGITUDE: 89° 30'

Month	Day	Year (19-)	Temp (C)	Salinity (ppt)	D.O. (ppm)
09	26	75	25.0	20.1	8.4
			27.3	25.8	4.7
11	16	75	20.2	19.2	10.2
			25.5	24.9	5.6
02	23	76	17.5	31.5	7.5
			19.0	35.8	6.1
04	27	76	24.0	19.6	11.0
			20.5	33.0	5.2
08	06	76	30.0	25.9	7.6
			23.0	36.6	1.0

STATION: F-6 DEPTH: 37m LATITUDE: 28° 55' LONGITUDE: 89° 30'

Month	Day	Year (19-)	Temp (C)	Salinity (ppt)	D.O. (ppm)
09	26	75	25.0	21.2	9.1
			27.3	26.4	5.6
11	16	75	20.0	17.0	12.2
			24.5	25.2	5.1
02	23	76	17.2	26.8	8.0
			19.2	35.7	5.4
04	27	76	24.0	19.4	12.0
			20.0	33.8	4.6
08	06	76	29.0	31.0	8.0
			20.0	34.5	3.4

STATION: F-7 DEPTH: 55m LATITUDE: 28° [illegible] LONGITUDE: 89° 30'

Month	Day	Year (19-)	Temp (C)	Salinity (ppt)	D.O. (ppm)
09	26	75	23.6	18.5	8.0
			23.0	28.2	4.5
11	16	75	26.5	15.7	11.6
			23.5	27.7	4.8
02	23	76	15.0	25.0	8.3
			19.0	35.9	6.8
04	27	76	24.0	20.2	9.2
			19.8	33.8	3.9
08	05	76	29.5	27.8	7.8
			19.5	34.4	4.8

STATION: F-8 DEPTH: 73m LATITUDE: 28° 49' LONGITUDE: 89° 30'

Month	Day	Year (19-)	Temp (C)	Salinity (ppt)	D.O. (ppm)
09	26	75	25.0	21.6	8.6
			21.2	27.9	4.5
11	16	75	20.0	14.7	10.8
			20.5	26.1	4.2
02	23	76	16.8	29.8	8.2
			19.0	35.8	4.9
04	27	76	23.0	23.4	11.6
			19.5	34.0	5.6
08	05	76	30.0	27.5	7.8
			19.0	32.6	4.1

TABLE 7. (cont.)

STATION: F-9 DEPTH: 91m LATITUDE: 28° 42' LONGITUDE: 89° 30'

Month	Day	Year (19-)	Temp (C)	Salinity (ppt)	D.O. (ppm)
09	26	75	24.2	19.8	7.9
			19.8	27.6	4.3
11	16	75	21.5	18.6	9.2
			16.0	27.2	4.7
02	23	76	18.0	32.8	8.4
			18.0	36.3	4.1
04	27	76	23.0	32.3	10.2
			18.7	33.6	5.3
08	05	76	29.0	27.4	7.3
			18.0	36.0	0.6

STATION: F-10 DEPTH: 110m LATITUDE: 28° 39' LONGITUDE: 89° 36'

09	27	75	24.3	21.7	7.9
			20.0	27.4	2.4
11	16	75	21.5	19.5	9.0
			13.5	26.0	3.8
02	24	76	-	-	-
			-	-	-
04	27	76	23.0	32.2	8.2
			17.8	34.6	4.1
08	05	76	30.0	26.3	8.2
			17.0	36.2	5.1

TABLE 8. Surface and bottom readings for temperature, salinity and dissolved oxygen at stations on Transect G.

STATION: G-1 DEPTH: 6m LATITUDE: 29° 25' LONGITUDE: 89° 05'

Month	Day	Year (19-)	Temp (C)	Salinity (ppt)	D.O. (ppm)
10	22	75	22.3	17.9	09.3
			23.2	22.4	08.4
12	04	75	15.0	20.0	09.8
			15.5	21.6	09.4
02	24	76	15.7	30.0	07.7
			16.0	32.4	07.2
03	25	76	18.6	22.2	10.4
			18.7	30.0	09.6
08	05	76	28.0	26.5	08.1
			28.0	-	07.4

STATION: G-2 DEPTH: 12m LATITUDE: 29° 23' LONGITUDE: 89° 02'

Month	Day	Year (19-)	Temp (C)	Salinity (ppt)	D.O. (ppm)
10	22	75	20.8	04.5	11.8
			24.5	25.2	07.9
12	04	75	13.7	15.4	09.9
			17.5	23.9	08.4
02	24	75	14.8	25.3	08.9
			17.0	33.8	06.8
03	25	76	19.0	22.9	11.2
			19.0	31.4	09.7
08	05	76	28.0	31.8	07.3
			22.5	30.6	05.0

STATION: G-3 DEPTH: 18m LATITUDE: 29° 20' LONGITUDE: 88° 59'

Month	Day	Year (19-)	Temp (C)	Salinity (ppt)	D.O. (ppm)
10	22	75	20.3	07.5	14.2
			25.2	27.1	06.5
12	04	75	14.0	17.0	09.2
			21.0	25.0	06.5
02	24	76	15.5	24.7	09.2
			17.8	36.2	04.4
03	25	76	19.0	22.8	11.8
			19.5	33.0	07.2
08	04	76	28.0	26.0	10.4
			21.0	31.9	06.7

STATION: G-4 DEPTH: 24m LATITUDE: 29° 18' LONGITUDE: 88° 57'

Month	Day	Year (19-)	Temp (C)	Salinity (ppt)	D.O. (ppm)
10	22	75	20.6	04.6	13.2
			27.2	27.2	05.5
12	04	75	14.0	15.4	09.2
			21.3	26.2	06.0
02	24	76	16.0	28.0	08.4
			17.8	36.4	04.2
03	25	76	19.0	22.7	11.0
			19.7	34.0	06.6
08	04	76	28.0	25.0	09.0
			21.0	31.9	05.6

TABLE 8. (cont.)

STATION: G-5 DEPTH: 31m LATITUDE: 29° 17' LONGITUDE: 88° 55'

Month	Day	Year (19-)	Temp (C)	Salinity (ppt)	D.O. (ppm)
10	22	75	21.5	07.4	13.8
			24.8	27.5	05.9
12	04	75	15.0	16.6	08.8
			22.0	25.2	06.0
02	24	76	17.2	29.9	09.0
			18.0	36.0	04.6
03	25	76	19.0	23.4	11.6
			19.5	35.0	06.1

STATION: G-6 DEPTH: 37m LATITUDE: 29° 16' LONGITUDE: 88° 54'

10	22	75	22.3	04.5	08.2
			23.1	28.3	04.4
12	03	75	17.0	20.6	09.6
			22.0	26.4	05.0
03	25	76	19.0	27.6	11.8
			19.2	35.0	06.7

STATION: G-7 DEPTH: 55m LATITUDE: 29° 15' LONGITUDE: 88°52'

10	22	75	23.0	24.3	10.4
			21.4	29.1	04.1
12	03	75	20.0	23.9	09.6
			22.5	26.0	04.6
03	25	76	19.5	29.0	11.8
			18.6	35.8	05.3

STATION: G-8 DEPTH: 73m LATITUDE: 29° 10' LONGITUDE: 88° 47'

10	22	75	23.1	18.7	10.8
			21.0	28.2	05.8
12	03	75	21.0	24.0	08.1
			21.0	26.7	04.5
03	25	76	19.5	32.1	11.2
			18.7	35.6	05.4

TABLE 8. (cont.)

STATION: G-9 DEPTH: 91m LATITUDE: 29° 06' LONGITUDE: 88° 43'

Month	Day	Year (19-)	Temp (C)	Salinity (ppt)	D.O. (ppm)
10	23	75	23.7	21.3	10.4
			20.0	28.6	05.1
12	24	75	22.0	25.8	09.0
			19.0	26.2	04.3

STATION: G-10 DEPTH: 110m LATITUDE: 29° 04' LONGITUDE: 88° 41'

Month	Day	Year (19-)	Temp (C)	Salinity (ppt)	D.O. (ppm)
10	23	75	24.0	24.5	10.4
			18.9	28.4	03.8
12	24	75	27.0	21.5	08.7
			18.3	27.2	04.2

TABLE 9. *Surface and bottom readings for temperature, salinity and dissolved oxygen at stations on Transect H.*

STATION: H-1 DEPTH: 6m LATITUDE: 29° 49' LONGITUDE: 88° 48'

Month	Day	Year (19-)	Temp (C)	Salinity (ppt)	D.O. (ppm)
10	23	75	22.8	20.5	9.2
			24.2	24.7	8.0
12	03	75	17.0	16.3	9.8
			17.0	22.6	9.7
03	18	76	17.5	26.6	10.2
			18.3	32.8	9.8
08	04	76	28.0	-	8.8
			28.0	-	8.0

STATION: H-2 DEPTH: 12m LATITUDE: 29° 43' LONGITUDE: 88° 47'

10	23	75	22.9	23.3	10.2
			25.0	27.8	6.6
12	03	75	17.2	22.9	9.8
			17.0	24.4	9.6
03	18	76	18.0	26.4	11.0
			18.3	30.4	8.1
08	04	76	28.0	19.8	8.2
			23.0	30.8	7.5

STATION: H-3 DEPTH: 18m LATITUDE: 29° 29' LONGITUDE: 88° 44'

10	23	75	23.2	22.5	9.4
			25.2	27.2	6.8
12	03	75	20.0	24.6	8.7
			20.0	25.5	8.0
03	18	76	19.0	31.7	10.2
			19.2	34.4	6.2
08	04	76	29.0	24.0	10.4
			21.0	31.1	6.8

STATION: H-4 DEPTH: 24m LATITUDE: 29° 27' LONGITUDE: 88° 45'

10	23	75	23.3	23.8	8.5
			25.2	28.3	5.4
12	03	75	20.3	24.3	9.0
			21.2	26.3	7.5
03	18	76	19.2	31.0	11.2
			19.2	35.4	6.8
08	04	76	27.0	26.1	9.8
			21.0	31.9	6.4

STATION: H-5 DEPTH: 31m LATITUDE: 29° 26' LONGITUDE: 88° 43'

10	23	75	23.5	22.0	10.1
			25.0	27.8	5.6
12	03	75	20.5	24.5	8.7
			21.6	24.9	7.4
03	18	76	19.7	31.0	11.6
			19.0	35.6	7.5
08	04	76	28.0	23.5	11.2
			20.0	31.8	6.2

TABLE 9. (cont.)

STATION: H-6 DEPTH: 37m LATITUDE: 29° 25' LONGITUDE: 88° 43'

Month	Day	Year (19-)	Temp (C)	Salinity (ppt)	D.O. (ppm)
10	23	75	23.8	22.2	9.2
			24.0	28.3	4.5
12	03	75	20.5	24.0	7.5
			22.0	25.2	7.4
03	18	76	19.8	32.1	12.2
			19.0	35.6	7.8
08	04	76	29.0	27.7	8.6
			20.0	38.2	5.0

STATION: H-7 DEPTH: 55m LATITUDE: 29° 21' LONGITUDE: 88° 42'

10	23	75	23.5	23.3	9.2
			22.5	28.7	5.0
12	03	75	20.8	24.4	8.7
			22.5	27.7	4.9
03	18	76	20.8	34.5	10.6
			19.5	32.0	7.4
08	04	76	29.0	30.5	9.0
			19.0	38.8	6.4

STATION: H-8 DEPTH: 73m LATITUDE: 29° 12' LONGITUDE: 88° 40'

10	23	75	24.0	19.6	10.8
			22.3	28.4	5.6
12	02	75	22.0	24.4	8.8
			21.0	26.4	-
03	25	76	20.0	33.4	10.6
			18.8	32.0	6.0
08	04	76	29.0	22.0	8.8
			19.0	29.0	5.8