

Job Report

Ronnee L. Schultz
Marine Biologist

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Project Name: Fisheries Investigations in the Aransas-Copano Bay System
Period Covered: February 1, 1961 to December 31, 1961 Job No. E-1

Hydrographic Survey of Aransas, Copano and Mesquite Bays

Abstract: Salinity was fairly stable in 1961 and averaged somewhat lower than during 1960. The bay water was found to be more turbid in the winter.

Objective: The objective of this study is to provide data on the hydrographical and climatological conditions prevailing in the Aransas-Copano Bay system for correlation with fluctuations in populations of food and game fisheries animals.

Procedure: Twenty hydrographic stations were established in Aransas, Copano and Mesquite Bays (Figure 1). These stations were visited on or near the first and the fifteenth of each month. At each station water turbidity was measured with a U. S. Geological Survey turbidity rod and expressed as parts per million. From a water sample taken near the bay bottom the temperature was measured in degrees centigrade and the salinity determined with a specific gravity hydrometer and the use of Knudsen's Hydrographic Tables. If the water samples were too low in salt content to be measured with a hydrometer, the Mohr Titration Method was then employed.

All climatological data presented in this paper were taken from the U. S. Department of Commerce Weather Bureau's publication, Climatological Data of Texas.

Findings: The results of hydrographic sampling in Aransas, Copano and Mesquite Bays during 1961 appear in Tables 1, 2 and 3.

Salinity-precipitation comparisons are found in Figure 2. Water temperature in relation to air temperature is presented in Figure 3.

Discussion: Although the salinity averages of the three bays were different, the patterns of fluctuation were similar. It is also seen that salinities were somewhat lower in 1961 than in 1960. Rainfall was distributed over a period of several months in 1961, having a tendency to stabilize salinities. The lower salinity readings in 1961 were largely caused by a period of heavy rainfall in the latter part of 1960 and another such period during June and July of 1961. Since that time little precipitation has occurred; and salinity levels, while gradually climbing, have remained at a relatively constant level without dramatic changes.

Rainfall affects the salinity of all bays to a great degree; the effect is more noticeable in some areas. The salinity level of the lower portion of Aransas Bay is primarily regulated by exchange of water with the Gulf through Aransas Pass. Copano Bay salinity is controlled entirely by evaporation

Figure 1

Hydrographic Stations
in the Aransas-Copano Area

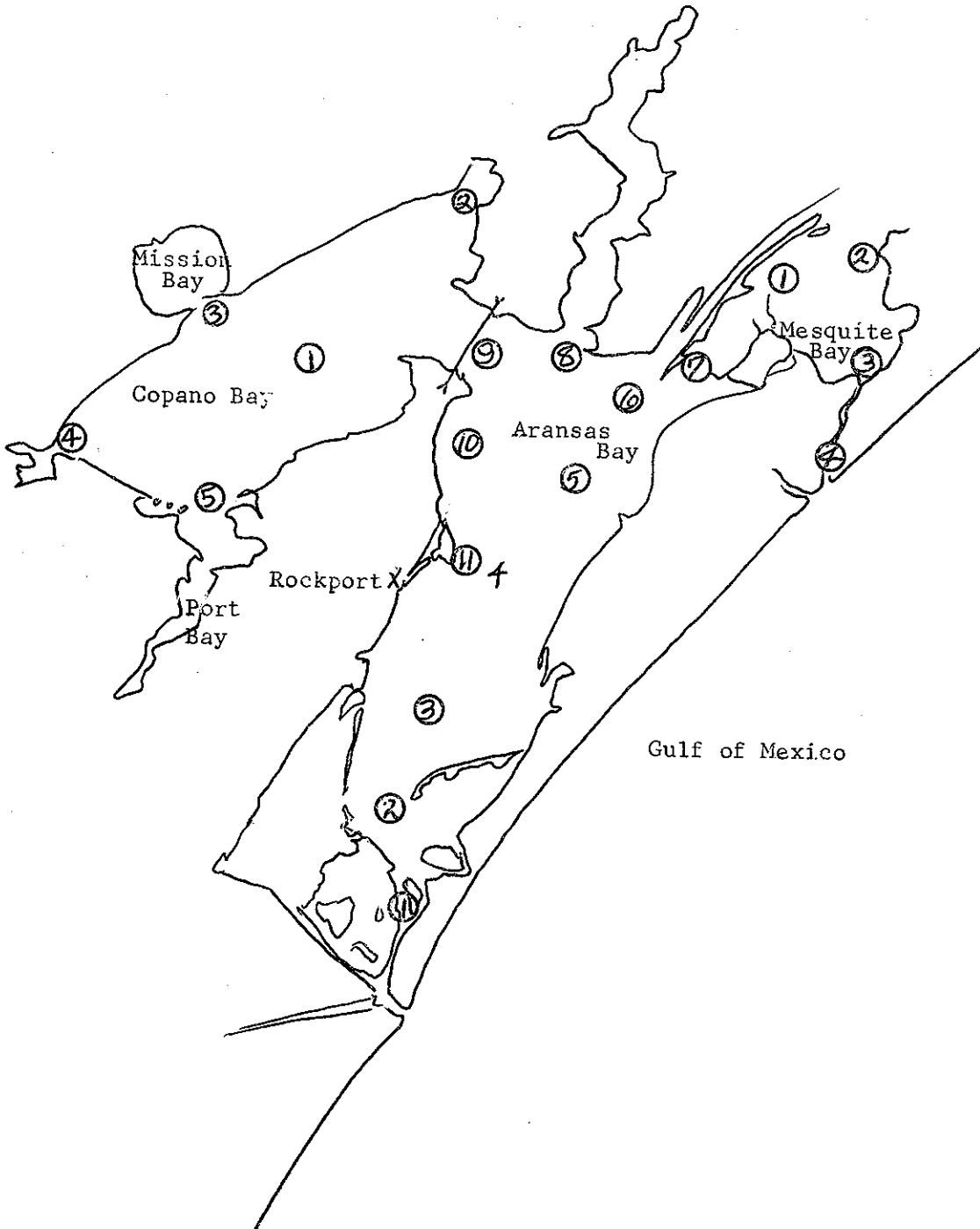


Table 1
Aransas Bay
1961

<u>Station</u>	<u>Month</u>	<u>Average Salinity</u>	<u>Average Turbidity</u>	<u>Average Temperature</u>
1	February	12.1	42	12.9
	March	27.0	26	20.9
	April	22.9	15	22.6
	May	29.6	15	26.2
	June	34.0	37	28.2
	July	35.9	20	28.5
	August	33.0	10	29.3
	September	24.1	55	26.8
	October	28.2	36	25.4
	November	25.8	43.5	22.6
	December	25.9	46	12.7
	2	February	10.5	42
March		24.7	25	21.0
April		22.9	16	22.5
May		26.8	19	26.1
June		30.8	18	28.1
July		33.1	16	28.4
August		31.6	9	29.1
September		19.9	37	26.6
October		26.5	42.5	25.3
November		26.6	23.5	22.6
December		23.5	52	11.8
3		February	11.1	30
	March	26.1	13	21.4
	April	20.2	19	22.6
	May	27.0	22	26.4
	June	19.4	16	28.2
	July	28.7	22	28.1
	August	27.5	8	29.0
	September	17.4	41	26.2
	October	22.2	27	25.5
	November	22.1	21	22.2
	December	21.3	91	11.7
	4	February	12.1	43
March		18.6	30	21.3
April		18.7	32	22.7
May		23.9	30	26.4
June		15.0	20	28.2
July		19.3	33	28.0
August		23.6	11	29.1
September		17.7	25	26.2
October		18.2	42	25.1
November		18.2	32.5	21.6
December		18.6	89	11.7

Table 1 Cont.

<u>Station</u>	<u>Month</u>	<u>Average Salinity</u>	<u>Average Turbidity</u>	<u>Average Temperature</u>
5	February	7.9	53	13.0
	March	14.9	27	21.5
	April	17.0	32	22.5
	May	22.4	52	26.4
	June	14.9	26	28.1
	July	18.2	48	28.1
	August	22.3	14	29.1
	September	18.4	35	26.2
	October	17.8	60	24.9
	November	18.2	29	21.6
	December	16.8	92	10.0
	6	February	6.8	46
March		15.6	57	21.9
April		14.9	45	23.0
May		20.4	47	26.8
June		16.0	30	27.9
July		17.9	43	28.2
August		20.3	19	28.9
September		19.9	40	26.4
October		19.6	31.5	25.2
November		20.0	25	22.4
December		16.8	69	10.7
7		February	4.2	59
	March	10.3	85	22.4
	April	14.2	70	23.0
	May	20.6	80	26.4
	June	17.5	63	28.1
	July	14.2	67	27.3
	August	18.1	28	28.8
	September	20.0	52	26.6
	October	18.8	50	25.0
	November	19.7	37	23.0
	December	16.5	61	10.1
	8	February	3.5	83
March		6.2	140	21.1
April		11.3	105	24.1
May		16.7	50	27.8
June		14.0	150	29.3
July		13.2	38	29.2
August		17.9	18	30.9
September		17.9	75	28.4
October		19.2	20	26.6
November		----	----	----
December		21.4	33	11.2
9		February	5.5	55
	March	8.6	52	20.2
	April	7.4	42	23.3
	May	10.0	40	27.2

Table 1 Cont.

<u>Station</u>	<u>Month</u>	<u>Average Salinity</u>	<u>Average Turbidity</u>	<u>Average Temperature</u>
9 (Cont)	June	12.4	48	29.0
	July	12.6	35	29.2
	August	17.9	23	30.0
	September	17.0	42	27.0
	October	18.4	29	26.8
	November	----	---	----
	December	17.4	41	11.8
10	February	7.7	44	13.9
	March	10.2	44	20.6
	April	12.7	60	23.2
	May	16.8	85	26.7
	June	13.5	31	29.1
	July	13.8	28	29.4
	August	20.7	18	30.1
	September	16.0	42	26.7
	October	19.0	25	26.3
	November	----	---	----
	December	17.2	42	12.0
	11	February	9.9	42
March		13.0	45	20.9
April		11.7	42	23.2
May		11.3	60	26.6
June		16.6	40	24.1
July		20.5	30	29.5
August		22.2	18	29.8
September		16.3	30	27.7
October		19.2	25	25.8
November		----	---	----
December		18.7	70	12.3

Table 2
Copano Bay
1961

<u>Station</u>	<u>Month</u>	<u>Average Salinity</u>	<u>Average Turbidity</u>	<u>Average Temperature</u>
1	February	2.4	75	14.3
	March	5.1	122	30.3
	April	6.6	69	24.0
	May	9.5	75	26.5
	June	11.7	72	28.4
	July	11.7	92	28.7
	August	11.8	18	29.6
	September	14.6	57	23.5
	October	15.2	42.5	23.6
	November	16.0	35	25.9
	December	17.2	37	11.1
	2	February	1.5	165
March		5.0	82	22.3
April		6.1	92	25.3
May		9.3	89	28.0
June		10.5	60	28.8
July		13.2	55	29.0
August		10.8	43	30.6
September		13.1	67	25.1
October		15.4	29.5	23.0
November		15.4	35	25.1
December		16.8	60	11.2
3		February	5.1	187
	March	3.0	100	21.1
	April	4.6	115	24.5
	May	6.2	117	27.8
	June	10.0	287	28.8
	July	10.1	140	28.8
	August	8.6	250	30.4
	September	13.9	87	24.4
	October	14.6	28.5	23.8
	November	14.3	35	26.2
	December	16.8	40	9.9
	4	February	1.3	127
March		4.0	90	20.6
April		4.4	92	24.9
May		6.1	65	27.7
June		8.2	300	29.0
July		9.5	130	28.9
August		9.4	43	30.2
September		11.9	77	24.0
October		14.4	42.5	26.7
November		14.9	35	25.4
December		16.6	45	11.2

Table 2 Cont.

<u>Station</u>	<u>Month</u>	<u>Average Salinity</u>	<u>Average Turbidity</u>	<u>Average Temperature</u>
5	February	2.3	77	14.4
	March	3.3	80	21.5
	April	4.6	87	24.3
	May	6.7	67	28.2
	June	9.7	180	29.1
	July	9.4	110	28.9
	August	9.4	21	29.9
	September	12.9	87	23.7
	October	14.7	41.5	23.2
	November	14.9	28	26.1
	December	16.6	35	11.1

Table 3

Mesquite Bay
1961

<u>Station</u>	<u>Month</u>	<u>Average Salinity</u>	<u>Average Turbidity</u>	<u>Average Temperature</u>
1	February	7.2	65	13.8
	March	8.3	82	22.4
	April	9.3	85	23.0
	May	19.7	75	26.7
	June	15.3	90	28.0
	July	13.1	38	27.3
	August	17.4	18	29.2
	September	17.7	75	26.4
	October	18.4	57.5	25.4
	November	20.2	36.5	22.8
	December	18.2	105	10.1
	2	February	3.9	150
March		12.4	46	22.0
April		18.7	85	23.0
May		22.5	32	26.9
June		15.1	55	28.2
July		18.6	35	28.1
August		23.4	28	29.1
September		17.8	42	26.5
October		19.5	60.5	25.1
November		21.0	39.5	23.2
December		17.8	69	10.0

Table 3 Cont.

<u>Station</u>	<u>Month</u>	<u>Average Salinity</u>	<u>Average Turbidity</u>	<u>Average Temperature</u>
3	February	5.1	117	14.3
	March	23.7	25	22.2
	April	24.6	45	22.9
	May	26.5	42	26.1
	June	24.7	71	28.4
	July	32.9	28	28.2
	August	26.2	23	29.0
	September	20.8	42	27.0
	October	24.4	78	25.0
	November	26.0	44	23.0
	December	19.0	107	10.2
	4	February	17.7	102
March		27.0	52	22.5
April		30.2	72	24.2
May		32.4	50	26.6
June		32.1	105	29.3
July		33.8	30	28.6
August		29.6	18	30.0
September		21.6	30	28.3
October		27.2	78	27.2
November		26.3	55.5	25.0
December		20.7	164	12.2

Figure 2
 A Comparison of Salinities in Relation To Rainfall in 1960 and 1961

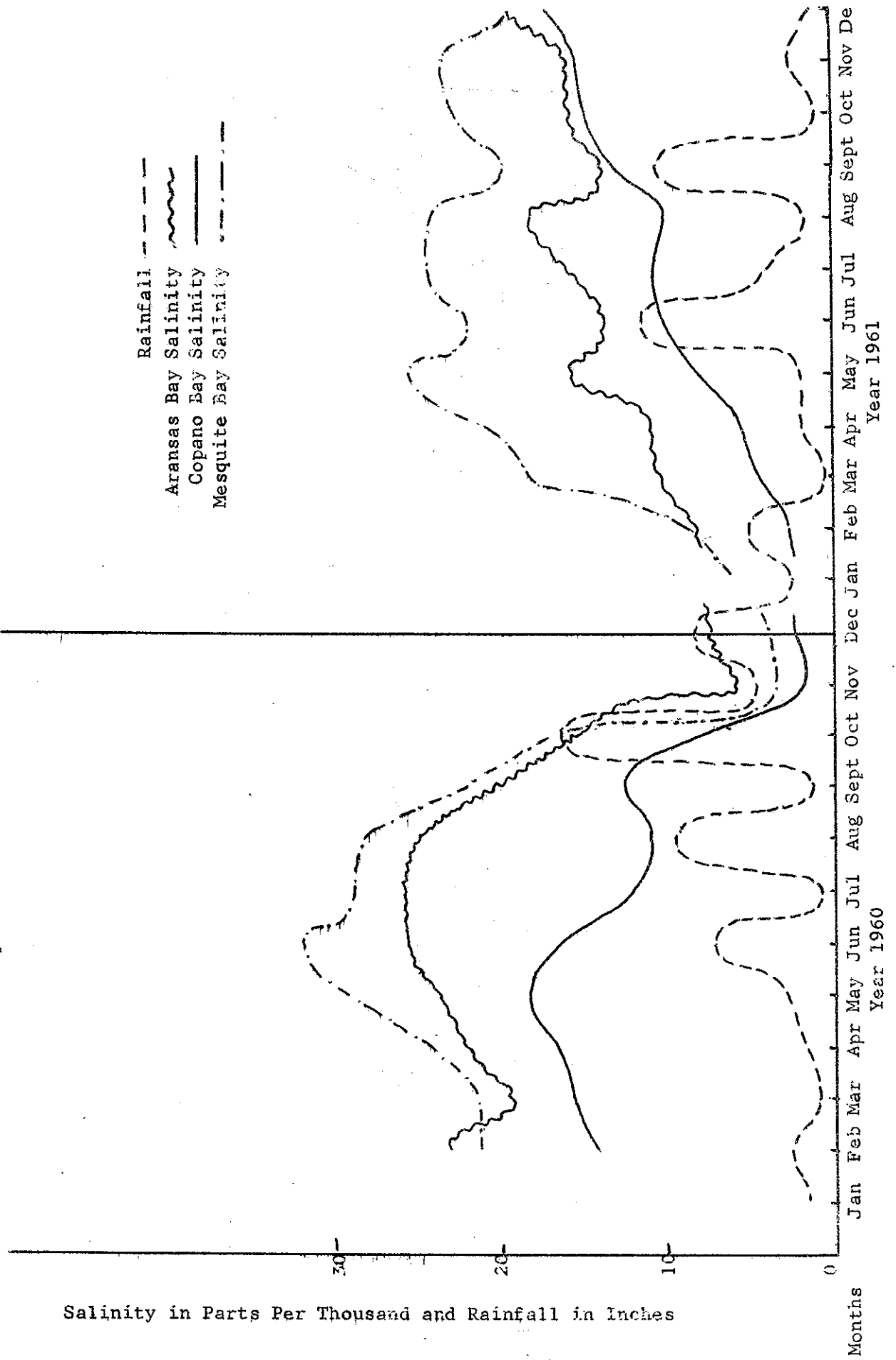
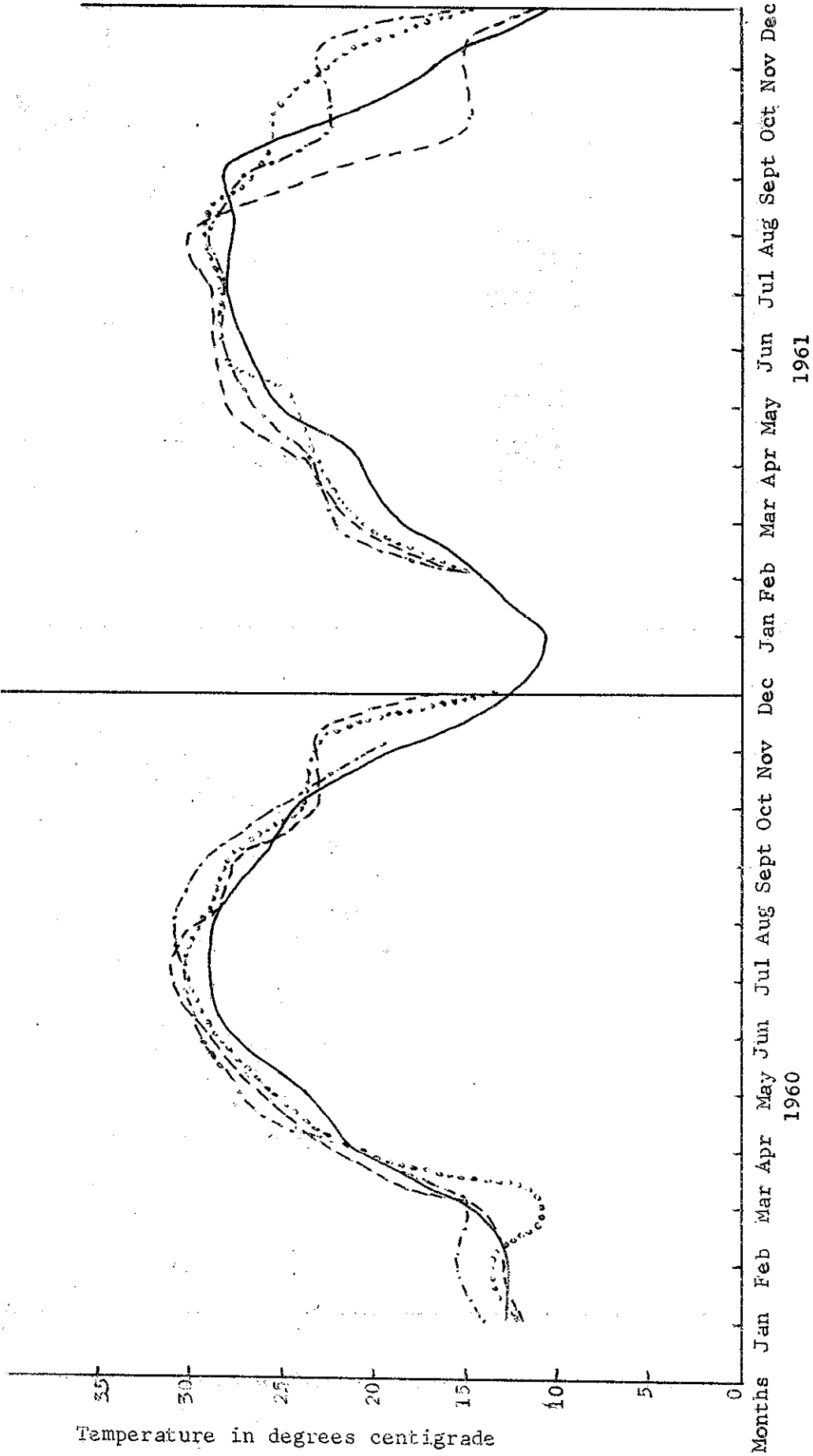


Figure 3
 A Comparison of Average Bay Bottom Temperature to Air Temperature

Aransas Bay
 Copano Bay
 Mesquite Bay
 Air Temperature



and by the influx of fresh- or salt-water from the Aransas and Mission Rivers. Mesquite Bay, on the other hand, has its salinity level regulated by water from the Guadalupe River via San Antonio Bay and by water exchange with the Gulf of Mexico through Cedar Bayou.

Water turbidity (Tables 1, 2 and 3) was greater during the winter months. Higher winds and the influx of silt-laden flood waters were the causes of this increase in turbidity.

Water temperatures were found to correspond closely with adjacent air temperatures. Figure 3 shows that the average water temperature was actually higher than the mean air temperature except during spring and fall months. At that time the change in water temperature lagged behind air temperature changes.

Conclusions: If rainfall was evenly distributed over a year's time, bay salinities would remain relatively stable.

Drouth conditions in this area would cause a great increase in water salts in Copano Bay over present salinity levels. Aransas and Mesquite Bays would also show a change in salinity; but because of their exchange with waters of the Gulf, these increases would be much less drastic.

Periods of heavy rainfall during the latter part of 1960 and again in mid-1961 caused salinity to be lower than in the preceding year.

Water turbidity was higher in winter due to northerly winds and silt-laden river discharges.

Prepared by: Ronnee L. Schultz
Marine Biologist

Ernest G. Simmons
Regional Supervisor

Approved by Terrance R. Leary
Coordinator

