

# JOB REPORT

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Project Name: Ecological Survey of Area M-1

Period Covered: February 1, 1960 to August 31, 1961 Job No. E-2

## Hydrographic and Climatological Study of Area M-1

Abstract: In order to measure the characteristics of water and climate present in Area M-1, water samples were taken monthly from Sabine Lake for salinity and temperature determination. Data on air temperature, precipitation, wind and river discharge were taken from publications.

Air and water temperature averages were found to show considerable variation in some months. This was due to the fact that water temperatures were recorded only once each month.

Salinities in Sabine Lake are normally low. During the course of the nineteen month study, salinities averaged below 15 parts per thousand in all months except June, 1960.

Horizontal and vertical salinity gradients were present. The vertical gradient is especially conspicuous in that portion of the lake nearest the Gulf. The horizontal gradient, with highest salinities in that portion of the lake nearest the Gulf, is disrupted during periods of low river discharge. During such periods, high salinity water enters the upper end of the lake by way of the Sabine-Meches Ship Channel resulting in higher salinities at each end of the lake with lesser salinities in the center.

Objectives: To gather information on the hydrography and meteorology of Sabine Lake.

Procedures: Hydrographic data were collected monthly from Sabine Lake in conjunction with bay studies of fish, crabs and shrimp.

Information recorded in the field included surface and bottom water temperature and salinity, water depth and the time of each sampling. Salinity was determined by titration with silver nitrate using potassium chromate as indicator.

Information on rainfall, air temperature and river discharge were taken from various publications.

Findings: Figure 1 is a map of Sabine Lake showing location of collection stations.

## I. Climatological Data

- A. Air Temperature: Figure 2 gives mean monthly air temperature for the Port Arthur Airport. This information is taken from the U. S. Weather Bureau's publication, "Climatological Data, Texas". Included in Figure 2 is the average monthly water temperature for Sabine Lake as determined from field data. In some instances, there is considerable difference between monthly air and water temperature means. This is due to the fact that water temperatures were recorded only one day each month.
- B. Precipitation: Figure 3 presents monthly rainfall as recorded at the Port Arthur Airport. Included are the long term averages for each month. This information is taken from "Climatological Data, Texas."
- C. Wind: Since wind has such a pronounced effect on tides along the coast, it is an important feature of the climate. Table 1 gives the prevailing wind, the percent of time prevailing and the average wind velocity by month for the Port Arthur Airport as taken from "Climatological Data, Texas"

## II. Hydrographic Data

- A. Salinity and River Discharge: Figure 4 gives average monthly salinity for Sabine Lake and the monthly river discharge from the Sabine and Neches Rivers. Average salinities are determined from field data collected once each month.

River discharge data are taken from unpublished records of the United States Department of Interior, Geological Survey, Surface Branch. The data reported here are derived from gauge stations located at Evadale, Texas, (Neches River) and Ruliff, Texas, (Sabine River).

- B. Water Temperature: Average monthly water temperatures are presented in Figure 2. No data are available for April or December, 1960 or for April or July, 1961.
- C. Circulation: Vertical and horizontal salinity gradients were found to exist in Sabine Lake. The vertical gradient is most common in that portion of the lake nearest to the Gulf of Mexico.

A horizontal salinity gradient, with higher salinities in the portion of the lake nearest the Gulf and decreasing salinities toward the opposite end, was the normal pattern. June, September and October, 1960, were exceptions to this. During these months, salinities were higher at each end of the lake than in the center. This situation occurs when river flow is low and high salinity water enters the upper portion of Sabine Lake by way of the Sabine-Neches Ship Channel.

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#### REFERENCES

U. S. Department of Commerce, Weather Bureau, 1960-61. Climatological Data, Texas, Vol. 65, Mbs. 2-12, Vol 66, Nos. 1-8, National Weather Records Center, Asheville, North Carolina.

U. S. Department of Interior. Geological Survey, Surface Water Branch, Form 9-192 a, 1960 and 1961 Water Year for Evadale and Ruliff, Texas.

Figure I

Area M-1 Collection Stations

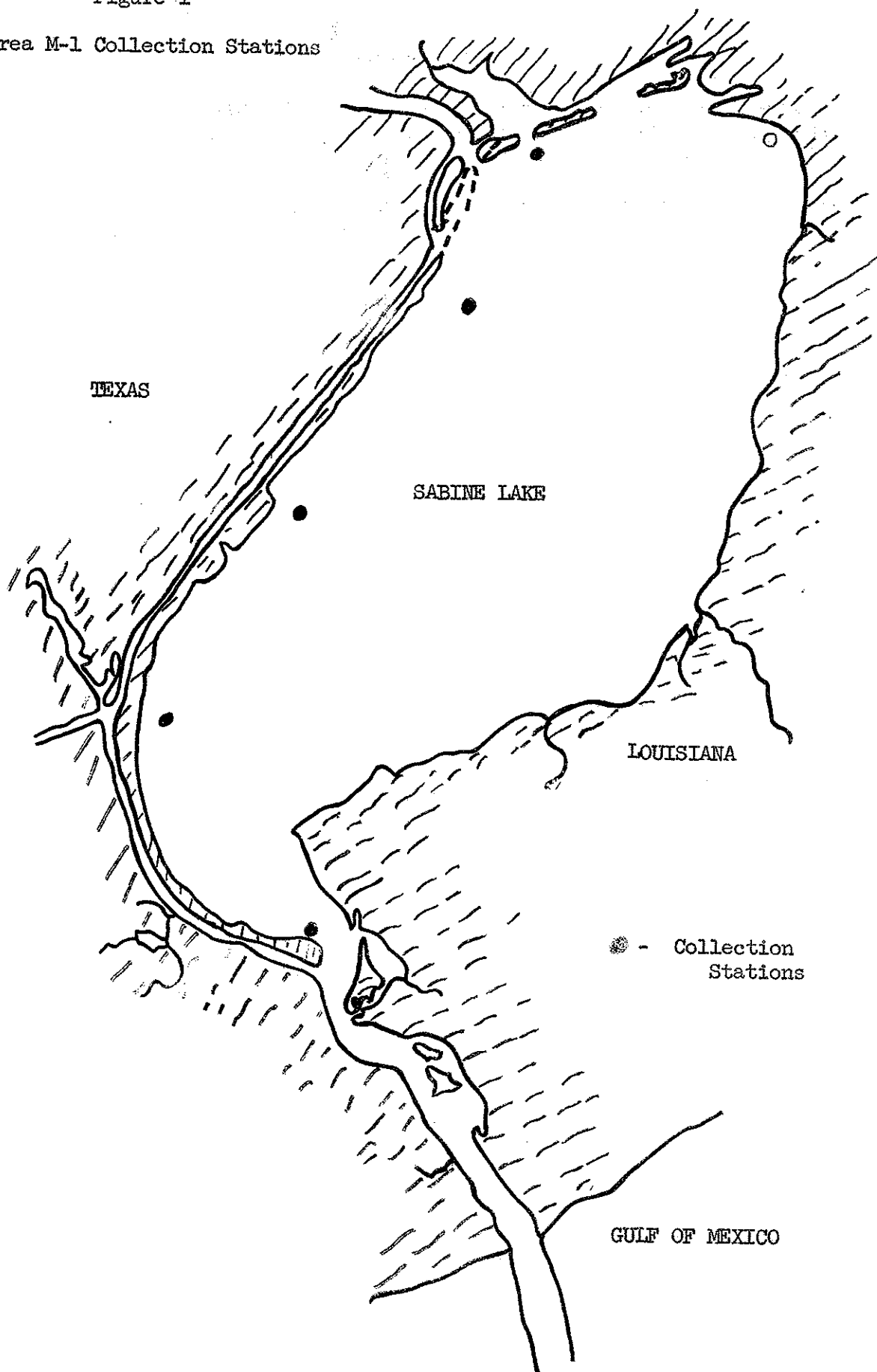


Figure 2

Average Monthly Air and Water Temperature, Area M-1

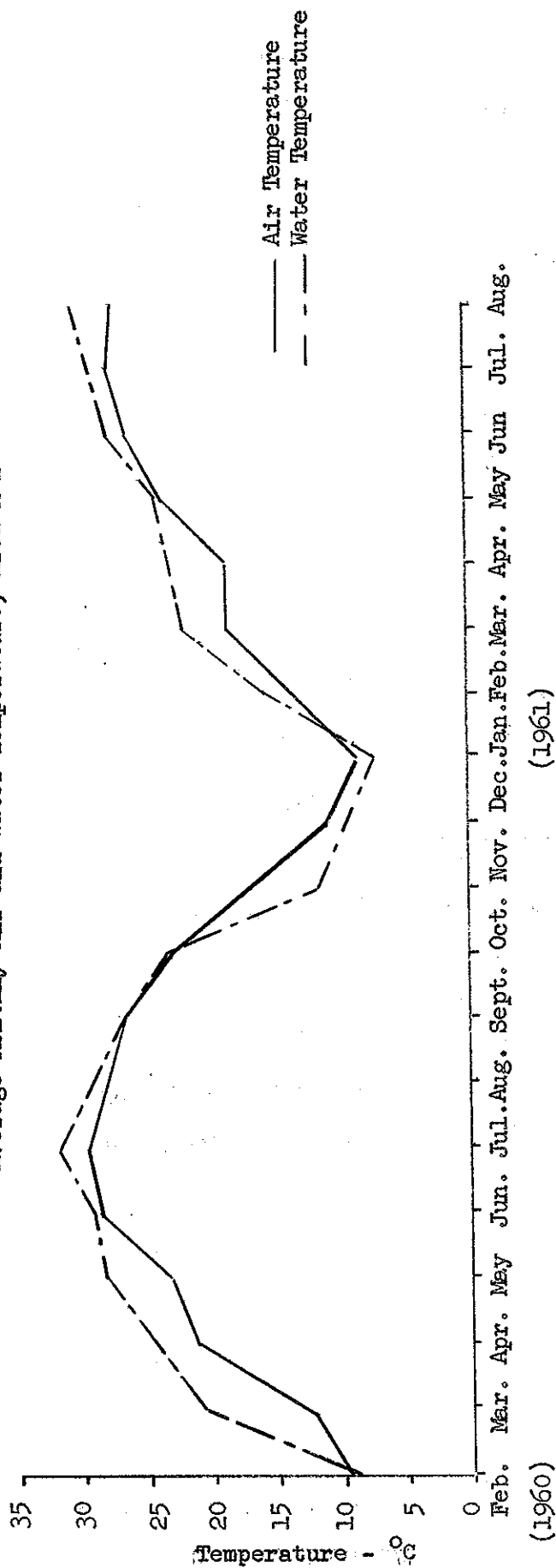


Figure 3

Monthly Precipitation and Long Term Means

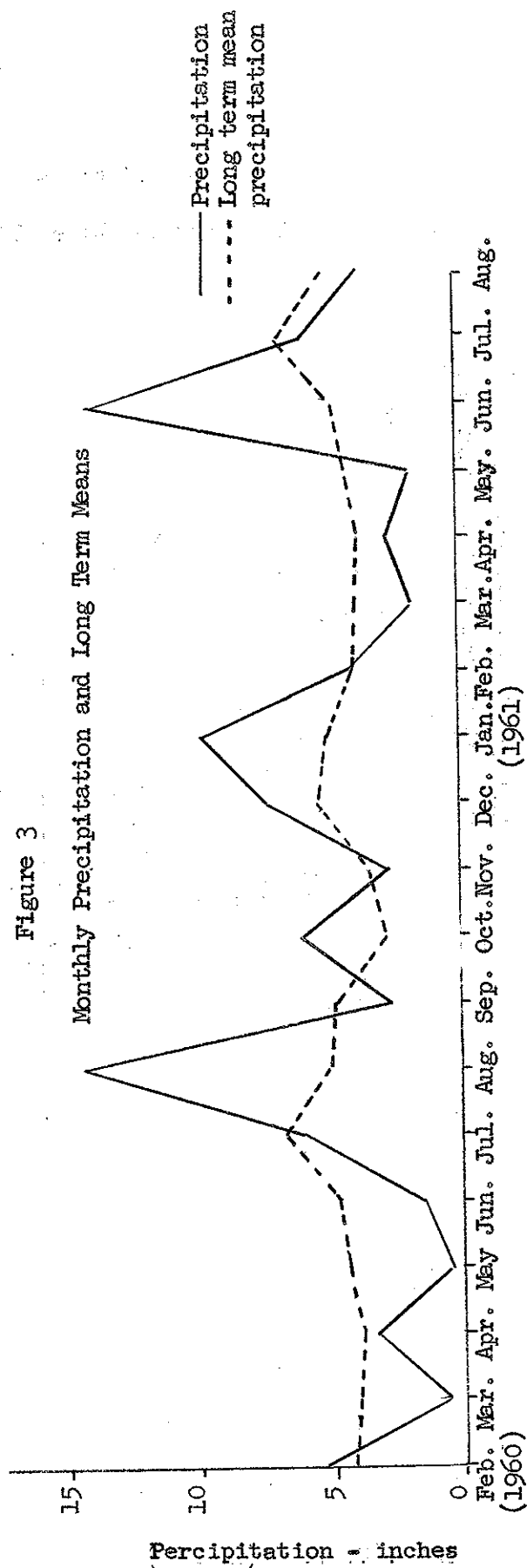


Figure 4

Salinity and River Discharge

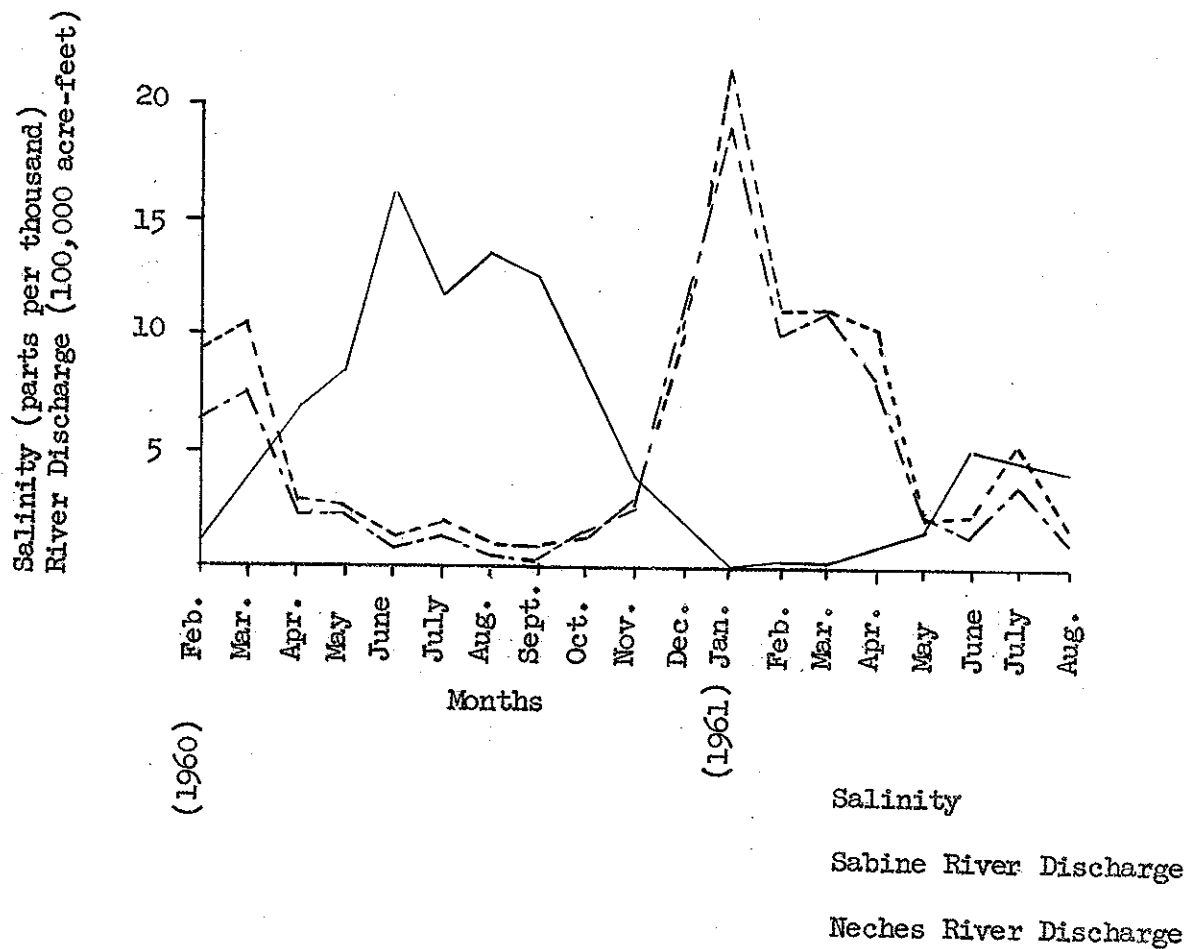


Table I

## Prevailing Winds - Port Arthur Airport

Month	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.
Prevailing Wind	E	ENE	ESE	SSE	S	SSW	E	N	ENE	ENE	E	ENE	S	SSE	S	S	S	S	NE
% of Time Prevailing	15	13	21	16	18	18	13	17	12	16	17	11	14	17	19	20	29	29	14
Av. Velocity in M.P.H.	14.1	12.9	13.4	12.6	10.7	8.8	7.8	8.6	9.4	9.4	10.8	9.7	10.6	12.4	12.0	10.8	8.8	7.1	6.9

