Roy B．Johnson
Marine Biologist


Hydrographic and Meteorological Study of the Lower Laguna Madre
Abstract：Water surface temperatures were relatively low in the spring of 1964 due to abnormally low air temperatures in late February and unusually high in November and December．Two days with below freezing temperatures were recorded in February．Rainfall was 11.0 inches below normal in 1964 compared to 8.0 inches below normal in 1963．Salinities were generally higher than in 1963，but were lower in 1964 during early summer．Salinities below 40.0 p．p．t．were recorded from the north end of the bay for the first time since August 1962.

Objectives：To gather information on the hydrography and meteorology of the Lower Laguna Madre．

Procedures：Water samples were taken monthly from each of the 16 hydro－ graphic stations shown in Figure 1．Water surface temperatures were recorded to the nearest 0.1 degree centigrade．Salinity was measured in parts per thousand using specific gravity hydrometers and Knudsen＇s Hydrographic Tables． Wind direction and velocity，turbidity，tide level and current direction were also estimated at the time each station was occupied．

Air temperature and precipitation data were obtained from the $U$ ．S．Weather Bureau at Brownsville，Texas．Tide data were obtained from the Harbormaster at Port Mansfield，Texas．Tide readings were taken daily from a tide gauge at Port Mansfield Harbor．

Findings and
Discussion：Month1y water surface temperatures by station are shown in Table 1．Average monthly air and water temperatures for 1963－1964 are presented in Figure 2．Air temperatures increased from an average of $14.7^{\circ} \mathrm{C}$ 。in February to $30.0^{\circ} \mathrm{C}$ ．in August 1964，and decreased from $28.4^{\circ} \mathrm{C}$ ．in September to $15.6^{\circ} \mathrm{C}$ ．in December．

Below normal air temperatures in late February produced cool water tempera－ tures in the spring of 1964．Water temperatures increased from an average of $7.3^{\circ} \mathrm{C}$ ，in January to $18.1^{\circ} \mathrm{C}$ ．in March，and to $23.6^{\circ} \mathrm{C}$ ．in Apri1．In 1963 average temperatures of 22.5 and $26.7^{\circ} \mathrm{C}$ 。 were recorded in March and Apri1， respectively．Highest water temperatures（ $29.0-30.0^{\circ} \mathrm{C}$ 。）were recorded during July，August and September 1964．Mild fall and winter weather was reflected in relatively warm water temperatures in November and December．In these months
average temperatures were 25.8 and $21.0^{\circ} \mathrm{C}$., respectively.
Monthly salinities by station are shown in Table 2. Tide, precipitation and salinity data for 1963-1964 are presented in Figure 3. Tides were highest from April to June and from August to November. No abnormal tides were noted. A total of 15.7 inches of precipitation was recorded. Monthly totals of $3.1,4.9$ and 2.8 inches were noted in May, September and December, respectively. Rainfall was 11.0 inches below normal compared to 8.0 inches below normal in 1963.

Salinities were generally higher in 1964 than in 1963, but were much lower in early summer. The average salinity decreased from 47.2 p.p.t. in January to 35.7 p.p.t. in June 1964. This decrease was related to rainfall, high spring tides, and strong southeast winds which circulated relatively low salinity water throughout the bay. The horizontal salinity gradient which normally existed from Station 14 to Station 25 (Table 2) was not observed in June. In this month salinities below 40.0 p.p.t. were recorded at Stations $23-25$ for the first time since August 1962. Monthly salinities increased to 40.9 p.p.t. in July and were above 40.0 p.p.t. through December.

Prepared by: Roy B. Johnson
Ernest G. Simmons
Marine Biologist Regional Supervisor


(
ن|

品








Average

 ..... $\stackrel{0}{\mathrm{~N}}$
 ..... $\stackrel{\infty}{\infty}$
Oct．  ..... $\stackrel{\ominus}{+}$
Sept．  ..... 0
－
2 Salinity（p．p．t．）by Station by MonthAug．+
$\stackrel{y}{*}$
Ju1y9
0
+
June  ..... n
宏  ..... $?$
Apr．  ..... $\stackrel{+}{-1}$
$\stackrel{-}{+}$
$\dot{0}$
$\sum_{i}^{\prime}$  ..... N
ベ
0
0
0
an  ..... $\stackrel{+}{ \pm}$
  ..... N
$\stackrel{y}{*}$
Station
 $\underset{\sim}{\sim}$ NヘNNさNAverage



[^0]Figure 3
Average Monthly Salinity, Total Monthly Rainfall,



[^0]:    Average Monthly Air-Water Temperacures
    Lower Laguna Madre $(1963-64)$

