

## Job Report

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Project No. M-8-R-1

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Project Name: Biological Survey of the Upper Laguna Madre, Baffin Bay and the Proposed Pass Area.

Period Covered: June 15, 1958 - June 14, 1959.

Job No. E-3.

### Basic Survey of the Area Near Yarbrough Pass

Objectives: To sample qualitatively and quantitatively the flora and fauna of an area in which a pass to the Gulf has been proposed. To establish bottom types of this area.

Introduction: Periodic proposals have been made that the upper Laguna Madre be connected to the Gulf of Mexico by means of a fish pass near old Yarbrough Pass. Many theories have been advanced as to the probable effects of such a pass but little factual evidence is available other than the scant bits obtained during previous openings. At the time this project was initiated there was some possibility that the inlet might be opened; at the close of the project this possibility was remote. Nevertheless, such data as have been accumulated might be used at a later date, and certain difficulties encountered in this survey might result in modifications of future studies.

Procedures: Ten closely spaced stations were set up and marked with pilings or anchored buoys. These were so established that, using Yarbrough Pass as a focal point, one set of stations radiated at an acute angle from the pass and the other set a less acute angle. The exact locations are shown in Figure I, and Figure II shows the position relative to the rest of the upper Laguna Madre. Figure I includes a general description of the type bottom found at each station.

As soon as the stations were well marked, the bottom type was determined by wading or swimming, and core samples 18 inches deep were secured. These were sent to the Institute of Marine Science for analysis. Once each month an attempt was made to sample each station for salinity, temperature, attached flora, fauna and for phytoplankton. Plans were also included to use push nets, gill nets and other fishing devices to sample populations. Difficulty arose when it was found that the distance to the site, 35 miles, required so much travel time that the latter methods had to be abandoned.

General Description of Area: The basin near Yarbrough Pass is five miles long in a north-south direction and at a point near the Intracoastal Waterway, and four miles wide in an east-west direction. It is actually a triangular shaped basin, for bars from Padre Island run roughly northwest and southwest from this island (Figure II). Spoils from the Intracoastal Waterway form an almost continuous bar separating the basin from the rest of the Laguna Madre. However strong currents flow through such openings as a present and floating objects in the basin often end up on Penascal Point.

Depths in the basin average about five feet with the greatest depth of eight feet occurring near the spoil areas. The bottom is composed of sand in areas near the bars with scattered shell and vegetation found near

FIGURE I

Specific Location of Stations for Job No. E-3 and Description of Bottom Type at Each Station

Station	Location	Depth	Type bottom
Yarborough Pass 1	27°11'40"N, 97°23'18"W	32"	Hard sand, sparse veg.
Yarborough Pass 2	27°12'25"N, 97°23'20"W	42"	Mud (10 cm) over sand
Yarborough Pass 3	27°11'35"N, 97°24'10"W	87"	Reduced mud (20cm) over sand
Yarborough Pass 4	27°12'35"N, 97°24'10"W	72"	Reduced mud (20cm) over sand
Yarborough Pass 5	27°11'40"N, 97°25'00"W	88"	Reduced mud (50cm) over small rocks and sand
Yarborough Pass 6	27°12'30"N, 97°24'25"W	72"	Hard sand, small rocks
Yarborough Pass 7	27°10'30"N, 97°24'10"W	54"	5 cm. Mud over hard sand
Yarborough Pass 8	27°09'58"N, 97°25'00"W	36"	Hard sand
Yarborough Pass 9	27°13'10"N, 97°24'00"W	18"	Broken shell, sand, vegetation
Yarborough Pass 10	27°13'50"N, 97°24'10"W	36"	Sand, few scattered rocks

stations Yarborough Pass 9 and 10. Near the spoils small scattered rock and some gravelly sand is found. All of the rest of the basin has a soft muddy substrate. This is due, in part at least, to dredging of the many oil channels which honeycomb the area. Attached vegetation, generally sparse, is represented by Diplanthera wrightii, and was found only near stations Yarborough Pass 1, 2 and 9. The water is normally muddy or otherwise discolored as the basin is a natural trapping area for hypersaline water from the flats.

#### Hydrographic Data

Temperature: Water temperature though the year ranged from 2.8 to 32.0 degrees centigrade and all of the basin except Yarborough Pass 1 and 8 appeared to be uniform in this respect from top to bottom and linear. (i.e. Stations Yarborough Pass 2,3,4,5,6,7 and 9 always had the same temperature on a given date.) At Yarborough Pass 1 there was always a drop of about one degree in the summer when compared to the other stations, and Yarborough Pass 8 was normally higher as it was near the shallow bar.

Salinity: Salinity data are shown in Figure III and regular stations 34 and 37 are included for comparison. Asterisks indicate samples collected immediately after heavy rainfall and affected by seepage from sand dunes. These data show several aspects of this particular area. The first of these is that the basin became hypersaline, or more saline at least, at a more rapid rate than did the other areas of the lagoon nearby. For instance in June, 1958 both outside stations had lower salinity than did any station in the Yarborough Pass area.

FIGURE II  
Relative Location of Stations for Job #E-3.

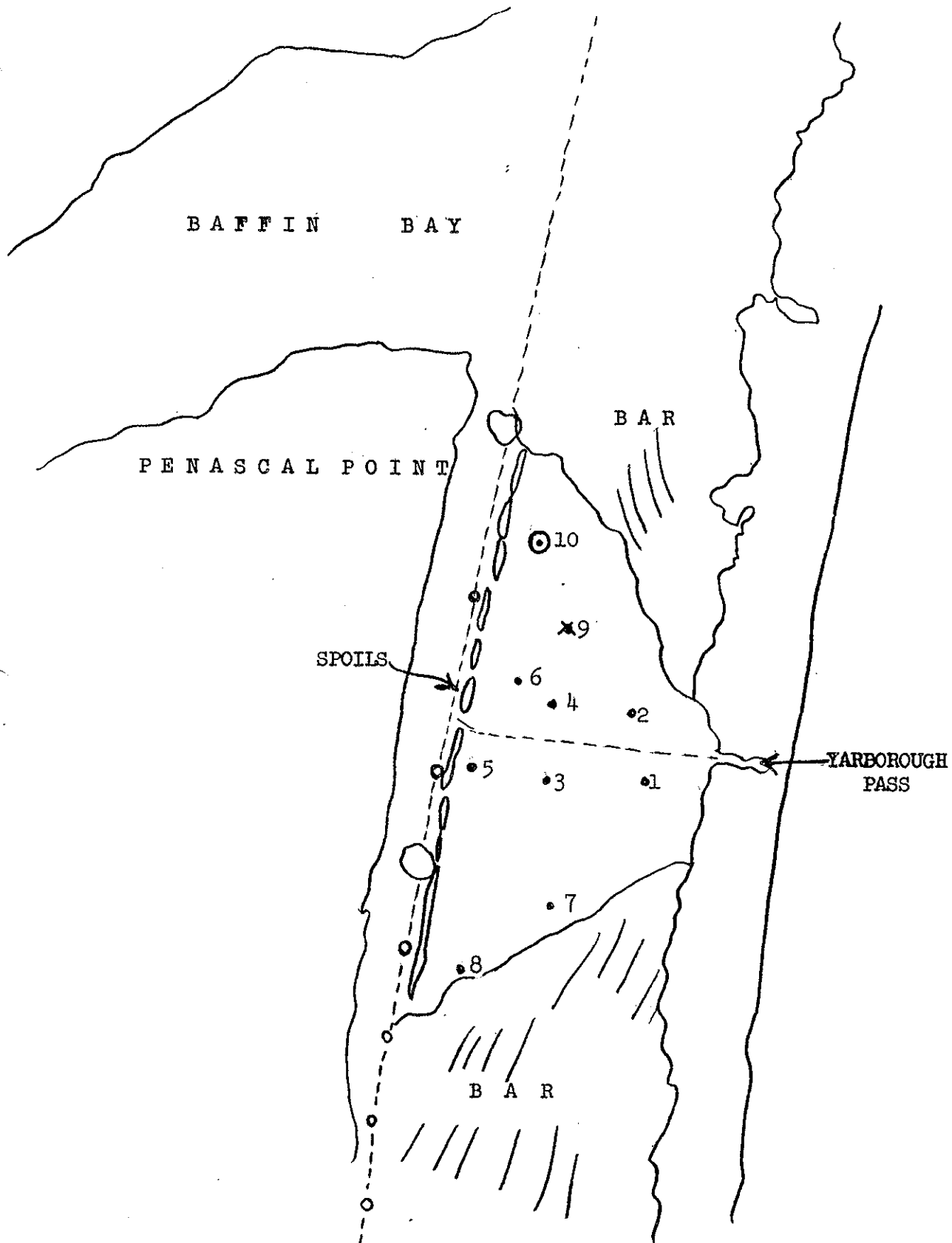


FIGURE III

Salinity Values by Month 1958-9 &amp; Station for Yarrowbrough Pass Area.

Station	June	July	August	Sept*	October	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.
Yarrowbrough Pass 1	45.0	> 50	> 50	> 50*	32.1, 33.3	31.5	29.8	23.6	19.4*	26.0	26.8	33.2
Yarrowbrough Pass 2	45.0	> 50	> 50	> 50*	29.8, 34.5	34.0	29.8	23.5	19.5*	26.1	27.2	33.4
Yarrowbrough Pass 3	46.0	> 50	> 50	> 50*	39.2, 39.4	30.5	29.8	20.9*, 20.6	25.9	27.2	27.2	32.1
Yarrowbrough Pass 4	46.0	> 50	> 50	> 50*	38.1, 38.4	30.0	30.2	20.4*, 20.9	25.9	27.0	27.0	33.1
Yarrowbrough Pass 5	45.0	> 50	> 50	> 50*	38.9, 39.0	30.0	29.2	23.8, 20.6*, 20.9*		27.2	27.2	32.5
Yarrowbrough Pass 6	45.0	> 50	> 50	> 50*	39.4, 39.4	30.0	30.0	19.9*	25.8	27.4	27.4	33.0
Yarrowbrough Pass 7	45.0	> 50	> 50	> 50*	37.2, 37.7	30.5	23.5	19.5*	25.9	26.9	26.9	33.5
Yarrowbrough Pass 8	47.8	> 50	> 50	> 50*	39.5, 39.5	31.0	23.3	20.7*	25.6	27.1	27.1	33.5
Yarrowbrough Pass 9	47.8	> 50	> 50	> 50*	38.5, 38.7	31.0	23.4	21.9*	25.4	27.4	27.4	33.2
Yarrowbrough Pass 10	45.0	> 50	> 50	> 50*	37.6, 37.8	30.0	23.7	21.1*	25.4	27.2	27.2	33.0
Station 34	41.8	> 50	> 50	47.8*	36.4	31.5	30.5	23.3		25.3	27.4	32.0
Station 37	43.7	> 50	> 50	46.5*	39.0	26.5	30.5	22.9	20.7*	26.2	27.6	33.7

\*Immediately after heavy rainfall.

During July and August both zones were above 50.0 parts per thousand, but by September 1958 the outside stations had dropped well below 50 parts per thousand while those stations within the basin remained above this point. During the rest of the year this difference was not pronounced. Samples from surface and bottom in October indicated that there was definite lamination in the water near Padre Island but that such lamination was not very evident at the other stations.

Phytoplankton: Phytoplankton populations as indicated by millipore filter samples are described fully in a separate report and will be only briefly mentioned here. The area was characterized by populations of dwarf forms and in many cases exceedingly low standing crops of diatoms. There was, however, a large standing crop of chain forming blue green algae and of very small (2-3 microns) green flagellates. In almost every month the more shallow areas had more diatoms than the deeper areas. A breakdown by months follows giving the dominant species and the range in cell number between stations.

July -- Melosira sp., 500,000 - 1,235,00 cells/l.

August -- Much the same as July but many more blue-greens.

September -- Diatoms dominated by Melosira sp., 300,000/l and blue - greens.

November -- Achnanthes sp. (50,000/l) and Melosira sp. (25,000/l) Notable because of the lack of blue-greens.

January, 1959 -- During this month the phytoplankton varied considerably from station to station and many species were found. Several of these were characteristic of Gulf waters, i.e. Thalassiosira nitzchioides. Cocconeis sp., Licmophora sp. and Tabellaria sp. began to appear.

February, 1959 -- Again the station varied widely and Cocconeis sp. became dominant.

March, 1959 -- Phytoplankton became very sparse and thoroughly mixed. Cell counts of less than 2,000/l were not uncommon.

May, 1959 -- Samples were not complete but the three finished ones indicate that the population is still sparse and Melosira sp. is assuming dominance.

During the year of the survey there was a high standing crop of filter feeders and extremely rapid growth rates of such sessile organisms as barnacles. The standing crop of diatoms did not correlate well but this might be explained by a rapid rate of turnover. It is more probable that the chief food was blue-green algae and the small flagellates which would not preserve but which were observed in non-preserved samples.

Fauna: Attempts were made to obtain qualitative and quantitative values by month for each station. Faulty trawls nullified much of this effort but some data of general nature were obtained. Stations Yarbrough Pass 1,2,7,8 and 9 always yielded much larger quantities of fish and crabs per five minute trawl than did any other stations. This might simply have been caused by the trawl operating better in shallow water. There was no correlation between abundance or presence of shrimp and depth of water.

In July and August the entire area was noted to be swarming with Anchoa mitchelli and A. hepsetus. Among larger fish pinfish, spot, and croaker were dominant and were about equally represented. Other organisms collected were mullet, menhaden, black drum, catfish, sheepshead, flounder, trout, mojarra, eight-fingered threadfin, grooved shrimp and crabs. In September and October little was found but spot, croaker and a few pinfish. By December populations were very low in spite of cold weather which normally drives fish off shallow flats. In January and February a few pinfish were taken and small (20-40 mm.) spot and croaker were very abundant. In April and May 1959 the catch was completely dominated by small croakers, catfish and mature blue

crabs. Shrimp were scarce even in May when there was a large northward migration through the nearby landcut.

Drag seining operations indicated that this area is periodically populated with schools of black drum and isolated groups of large redfish. No sizable groups of trout were observed.

Concluding remarks: Although this survey has supplied some information of a general nature, its chief value lies in the fact that it serves as an initial experiment. Some of the difficulties encountered in the 1958-59 study could be eliminated and additional facets could be added to provide for more accurate future surveys. Some suggested improvements are as follows:

1. Allot sufficient time for the survey particularly if the area to be sampled is very far from a base of operations. This survey was allotted ten percent of the total man-hours available, an inadequate ration of time.

2. Test and standardize equipment prior to start of survey.

3. Incorporate methods of sampling infauna and epifauna (dredges etc). The infauna particularly is not subject to day to day change but is very likely to be affected by a change in water circulation or source.

4. Arrange sampling so that aliquots can be retained for weighing and/or measuring. This will, of course, affect the time allotted for the program.

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