A Checklist of Fishes of Area M-3.

Objectives: To determine forms present, their relative abundance and life histories and relationships to hydrography.

Procedure: Stations were occupied in Area M-3 and collections were made monthly with seines, nets, trawls, etc. Associated data on hydrography and other data were taken.

Findings: Description of Areas

East Bay has been adequately described by Reid (1955a and later papers). East Bay is similar to West Bay in depth orientation, but differs considerably in bottom sediments. Much of East Bay is deep mud, unconsolidated but not reduced. In many places in the upper end the mud is loose to a depth of four feet below the surface of the bottom. East Bay has several small bayous entering the upper end and receives a large amount of water from marsh drainage. Rollover Pass, opening into the upper end of East Bay, was re-opened on May 29, 1959 introducing high salinity water into the bay. Discussion of the fauna of East Bay will not include the recent marine invaders apparently due to the opening of Rollover.

West Bay is an elongate shallow bay which trends NE-SW. The upper end of the bay is marked by shallow areas and the Deer Islands, which may be the remnants of a relict tidal delta. The lower end of the bay is marked by the relatively stable tidal delta of San Luis Pass. The largest stream system entering West Bay enters in the southern end through Chocolate Bay. Salinities in this bay are the lowest for the area, and the fauna is correspondingly meager. A small creek, Highland Bayou, enters in the upper end, but it is freshwater. Flow is sporadic and small. A fairly large marsh drainage is apparently isolated from West Bay by the Intracoastal Waterway running north of West Bay.

West Bay is about fourteen nautical miles long (from Deer Island to tidal delta of San Luis) and about three miles across at its widest point.

While depths are usually less than five feet, waters near San Luis Pass are as deep as seven feet. The channel at San Luis may be twenty to twenty-five feet, but its depth varies greatly.

Lower Galveston Bay is a muddy-sandy area influenced by tides through Bolivar Roads. It is cut off from much of the Upper Galveston Bay area by the Texas City Dike.

Salinity

West Bay is the most northern outlier of high salinity water in
the northwestern Gulf of Mexico. During the study salinities were almost always over 20 parts per thousand. Apparently West Bay received some drainage from the marsh lying to the north of bay previous to the cutting of the new intracoastal waterway. *Ostrea equestris* has largely replaced *Crassostrea virginica* in the reefs. Because the same effect was caused by the recent drought, it is difficult to say that the population of *Ostrea* is permanent, but since the drought ended in 1957 it is probable.

West Bay can be classified as a polyhaline bay both from the standpoint of salinity and the fauna.

East Bay was a more typical estuary in that a salinity gradient existed from the upper to the lower end. Typically, salinities were less than 5 parts per thousand in the upper end and became gradually higher to 12-15 parts per thousand near Hanna's Reef. Similarly, low salinities were occasionally found far up Chocolate Bay. But the rainfall in the drainage system is sporadic and salinities were not always consistently low.

As Reid (1955a) found salinities to the right (looking down bay) were consistently lower than those to the left.

Temperature

An accurate range and average of temperatures was not determined due to the size of the areas. However, surface water and air temperatures were similar except in the deeper areas of Bolivar Roads, the Houston Ship Channel and the Texas City Channel. Being deeper they changed temperature more slowly, but in winter they were as cold (7° C.) as were shallower waters. Since the data is sporadic and shows little deviation from temperatures in Upper Galveston Bay and other Texas Bays, the data are not presented. The impetus for the fall migration of fishes was due to drops in temperature, but since there are many deep channels in the area, most fishes remained in the bay further into the winter than is typical of other Texas Bays.

Plants of Area M-3

Most of the area was characterized by the emergent grass *Spartina* growing on shore. East Bay contained essentially no submerged vegetation except a very rare red algae.

The algae were not studied extensively, but West Bay contained the greatest variety and probably the largest mass. *Gracilariia cornea*, *Cladophora*, *Ulva*, *Enteromorpha* and several other algae were abundant in West Bay during the spring.

The spermatophytes were not accurately mapped, for they occurred sporadically and in irregular spacing. *Ruppia maritima* occurred in pure stands in upper West Bay near San Luis Pass. *Thalassia testudinum* beds were widespread along the southern shore of West Bay, but did not grow in pure stands. Leaves of *Diplantheria wrightii* were found floating in the water, but no stands were located.

The Following Species of Fishes have been Taken in Area M-3

*Dasatis sabina* (LeSueur). The stingaree was not common but was found in every month.
Gymnura micrura (Bloch and Schneider). The butterfly ray was rare in the area and was found only in the vicinity of San Luis Pass and Bolivar Roads.

Lepisosteus spatula (Cope). The alligator gar is widespread in the area, being very abundant in East Bay. It frequents most all of the harbors in the area.

Brevoortia patronus Goode. Young and juvenile menhaden were one of the most abundant fishes of the area.

Anchoa mitchilli (Valenciennes). This anchovy is one of the most common fishes of the area and is particularly abundant in Upper East Bay.

Anchoa hepsetus (Linnaeus). This anchovy is relatively rare, having been found only in lower Galveston Bay and West Bay.

Synodus foetens (Linnaeus). Lizardfish are not common in the area.

Urophysis floridanus (Bean and Dresel). This species was common in West and lower Galveston Bay from February through April. Young were common only in February and March.

Syngnathus sp. Two species of pipefishes S. scovelli and S. floridana were common in the Thalassia flats in West Bay.

Mugil cephalus Linnaeus. Mullet were very common in the area the year round but were taken in trawls only when they were driven to deeper water by cold weather. M. curema Valenciennes also occurred but was uncommon.

Polydactylus octonemus (Girard). Young threadfin were not uncommon in April and May in West Bay. However, none were taken in East Bay.

Centropristes philadelphicus (Linnaeus). This sea bass was common in certain areas during the winter months. It was taken most often in deep channels but was also found in the shallows of West Bay. Only a very limited size range was taken.

Carangidae

Members of this family are only strays into the area, but a few species are occasionally taken in the Houston Ship Channel. These are: Caranx hippos, Chloroscombrus chrysura, Vomer setatinnis, Selene vomer, and Oligoplites saurus.

Bucinostomus sp. Gerrids are a conspicuous part of the winter fauna of lower Galveston and West Bays.

Orthopristis chrysopterus. Pigfish were common in West and lower Galveston Bays during most of the year. Young were common in the grass flats of West Bay and older individuals were found most often in the vicinity of oyster reefs.

Sciaenidae

Members of this family were very abundant in the areas as is true for the whole Texas Coast. The most common species was Micropogon undulatus which was ubiquitous over the whole area. Young of the species were most abundant in the upper end of East Bay. Leiostomus xanthurus, Bairdiella chrysura, Stellifer lanceolatus, were also abundant. Sciaenops ocellata and Pogonias.
Cromis were also abundant, but seemed most common in East Bay. Hanna's Reef often produced large redfish and drum in spring and early summer.

Cynoscion notatus. This species was found only rarely in the vicinity of Bolivar Roads.

Cynoscion arenarius. This species was very common in parts of East Bay and the rest of the area, but it was most common in deeper areas.

Lagodon rhomboides (Linnaeus). The pinfish is one of the most abundant fishes in this region preferring areas of extensive vegetation and oyster reefs.

Archosargus probatocephalus (Walbaum). Sheepshead are relatively common sports fishes in the area. Adults have been taken and tagged (none returned) from the vicinity of oyster reefs. Young are abundant in areas of vegetation in West Bay. Young and adults are also common near piling and jetties in the vicinity.

Trachinotus lopes (Linnaeus). Cigalefish are one of the most abundant fishes in the area in November, and were common again in March through May in lower Galveston and East Bay. They were most common in lower Galveston Bay.

Citharinus spilopterus, Etropus crocoens, Enoplosus plagiusa, Trinectes maculatus, Ancylometta quadrorcellata.

These flatfishes were not common over most of the area, but they are often mistaken by laymen as the young of Paralichthys.

Paralichthys lethostigma. The southern flounder did not seem to be common in the area. Most were taken in the upper end of East Bay and the Intracoastal Waterway north of West Bay.

Sphoeroides nepherus (Goode & Bean). Puffers were not common, but were found occasionally in West Bay.

Porichthys porosissimus (Valenciennes). Mishipmen in the high salinity areas of the bay.

Opsanus beta (Goode and Bean). Toadfish were restricted to oyster reefs, sunken cans and the like, and were found everywhere but East Bay.

Distributions of Certain Fishes

Since West Bay has a much higher salinity, many marine species were taken here, but not in East Bay, (Table 1). This was presumably due mainly to salinity. However, the absence of a growth stage of at least two species in East Bay, juvenile Cynoscion nebulosus and Archosargus probatocephalus, is apparently due to high turbidity; and for a lack of vegetation may be a limiting factor. The young of redfish, croaker and flounder seemed to prefer the less saline upper end of East Bay.

West Bay is the northernmost outlier of high salinity water in the western Gulf of Mexico. Consistent with this is the similarity of the fauna of West Bay and the more polyhaline bays to the south. Since temperatures are not much different than those in the rest of the area, salinity is apparently the important factor in limiting the occurrence of marine forms in the Galveston Bay system.
During the winter months, the fish fauna was generally sparse, but the few fishes in the area tended to congregate in the deeper channels. Offats Bayou with depths over 30 feet had an intensive winter fishery, consisting of mainly Cynoscion nebulosus, but included Sciaenops ocellatus, Archosargus probatocephalus, Paralichthys lethostigma and occasionally a few other species. Immediately after a sharp temperature drop, large numbers of speckled trout and fewer numbers of other species were caught by sportsfishermen. Since Offats Bayou does not normally produce outstanding catches, except occasionally in the hotter summer months, it is concluded that these fish are driven to deeper water by temperature. Since any natural food supply would be rapidly depleted many of these fish would be caught on hook and line.

**TABLE 1**

Fishes Taken in West Bay But Not in East Bay

<table>
<thead>
<tr>
<th>Gymnura micrura</th>
<th>Cynoscion nebulosus (juv.)</th>
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<tbody>
<tr>
<td>Anchoa hepsetus</td>
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<tr>
<td>Urophycis floridanus</td>
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<tr>
<td>Centropristes philadelphicus</td>
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<tr>
<td>Opsanus beta</td>
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<tr>
<td>Orthopristis chrysopterus</td>
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<tr>
<td>Chloroscombrus chrysurus</td>
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<tr>
<td>Vomer setapinnis</td>
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<td>Selene vomer</td>
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<td>Ancylopsetta quadrocellata</td>
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<tr>
<td>Porichthys porossissimus</td>
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</tbody>
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