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DISTRIBUTION OF SEAGRASSES IN TAMPA BAY, FLORIDA

by

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DISTRIBUTION OF SEAGRASSES IN TAMPA BAY, FLORIDA

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ABSTRACT

A survey was made of Tampa Bay for marine grasses during autumn 1960. All seagrass growth was found shoreward of the one fathom curve (MLW). High water turbidity seemed the best explanation for this depth limit of growth. Two zones of plant growth seemed to prevail in all areas, except north of Courtney-Campbell Parkway where Ruppia dominated on flats from shallowest locations to the one fathom depth. Depending on the area of Tampa Bay generally, either Ruppia or Diplanthera dominated growth close to shore (roughly intertidal). Approximately at the spring low tide level Syringodium became dominant. Ruppia and Diplanthera were often found in the Syringodium zone but never in great amounts. Probably due to the prevalence of salinities below the optimum for Thalassia, that species was encountered only in sparse amounts.

INTRODUCTION

Accounts of seagrass distribution in Tampa Bay are scarce. Thorne (1954) briefly mentioned the presence of four seagrass species in the Tampa Bay region. I discussed four species of seagrasses found at various locations in this Bay, but located no published evidence of a general survey of the entire Bay (Phillips, 1960).

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Seagrasses form feeding and nursery grounds for marine and brackish water animals, some of which are important to both sports and commercial interests. Dredging and filling of submerged bay bottom, creating artificial real estate, is increasing, bringing a gradual depletion of seagrass growth. This report concerning the existing reservoir of plants is pertinent at this time.

METHODS

A field survey was made of the entire shoreline from Pinellas Point in Pinellas County to Piney Point in Hillsborough County in the autumn of 1960. Data from a survey made in Terra Ceia Bay, immediately east of the Manatee River mouth, on 13 January 1959, is included. This latter Bay is part of the overall Tampa Bay system. Ninety-eight sampling stations were made from Pinellas Point to Piney Point.

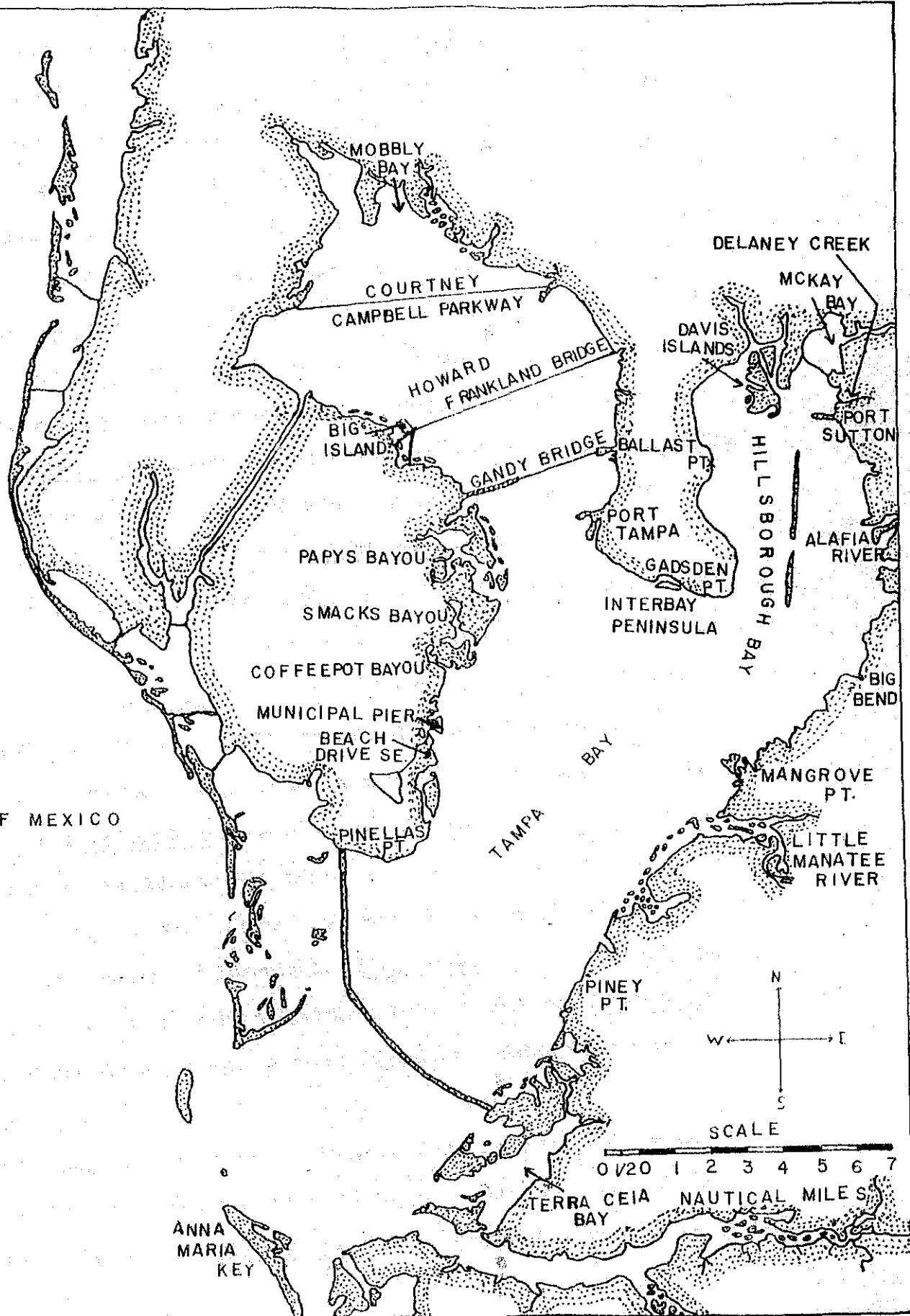
Hydrographic observations made at each station were these: depth of water, tide, time, water temperature, water salinity, water clarity, and substrate type. These observations were correlated with changes in plant abundance.

It does not seem practical to list all 98 stations on a map of the area, or to include all stations with hydrographic data in a table. Therefore, a general discussion of plants is given by area with hydrographic data included. Fig. 1 is a map of the area with major topographic and natural configurations included.

RESULTS

In this section salinity variations noted pertain to the area under consideration.

GULF OF MEXICO



From Pinellas Point to Beach Drive, SE, Thalassia was sparse, and Diplanthera was extremely abundant inshore. At Pinellas Point Syringodium was very abundant and luxuriant. Salinity varied from 20.4 - 22.8 o/oo.

Seagrass growth was varied on flats north of Municipal Pier, St. Petersburg, to Gandy Bridge. On the flats between Municipal Pier and Coffee Pot Bayou Diplanthera was abundant and luxuriant in shallow locations. Syringodium was very abundant and luxuriant on deeper portions of flats and offshore near the one fathom curve. Growth of this form was extensive. Flats at Smacks Bayou and northward to Papys Bayou presented patchy but luxuriant growths of Diplanthera inshore and very abundant and luxuriant Syringodium offshore. In Papys Bayou Syringodium and Ruppia grew abundantly while Thalassia was sparse but luxuriant. Diplanthera was sparse in patches on flats from Papys Bayou to Gandy Bridge. Again, Syringodium was abundant and luxuriant in deeper water. On Gandy flats, immediately south of the west end of Gandy Bridge, Syringodium was very abundant and luxuriant. Diplanthera was rare and not luxuriant. Salinity varied from 15.4 - 20.2 o/oo.

From Gandy Bridge to Big Island north of Howard Frankland Bridge, Diplanthera and Syringodium were extremely abundant and luxuriant in patches. Salinity varied from 12.6 - 14.4 o/oo.

North of Big Island, westward and northward to Courtney-Campbell Parkway, Ruppia was often dense and luxuriant. Diplanthera was occasionally found, but not in abundance and not in luxuriant habit. Offshore Syringodium was sparse to abundant in patches, and not luxuriant. Salinity varied from 12.1 - 13.1 o/oo.

In Old Tampa Bay north of Courtney-Campbell Parkway, flats shoreward of the one fathom curve were extensive. Ruppia was dominant and luxuriant on all depths of the flats. Diplanthera was occasionally found, and at times its

abundance nearly approximated that of Ruppia, but such occurrence was local. Salinity varied from 5.4 - 22.6 o/oo. Most observations ranged from 5.4 - 13.2 o/oo.

From Courtney-Campbell Parkway to Gadsden Point Ruppia was dense and luxuriant in patches inshore, and became more continuous offshore. Syringodium was abundant and luxuriant on the deeper portions of the flats. Thalassia was dense in rare patches in two locations, immediately north of Howard Frankland Bridge and immediately south of it. Salinity in this area varied from 12.7 - 15.0 o/oo.

In areas under discussion thus far the water was relatively turbid at the time of collection, owing to recent wind activity and resultant water turbulence. Immediately north of Gadsden Point the water became a brown chocolate color, a result of either sewage or industrial pollution or tannins. Bottom could not be seen in depths over one and one-half feet. Diplanthera was found to be extremely sparse as far north as Ballast Point. North of this location no seagrass was found. Diplanthera north of Gadsden Point was stunted in growth, probably a result of reduced salinity. At Ballast Point the water assumed a black appearance, possibly a result of the soft black muddy substrate. Water salinity from Gadsden Point to Davis Island Bridge varied from 5.4 - 10.0 o/oo. (On January 31, 1961, Ruppia was observed as very dense in one large patch and as occasional plants on the Bayshore Blvd. flats north of Ballast Point. Water clarity had improved in a spectacular manner, bottom being visible in six feet of water. Salinity on this date was 24.0 o/oo.)

From Davis Islands through McKay Bay no attached plants were found. The water exhibited an extremely turbid brown color. Bottom substrate was a soft brownish muck. Near Delaney Creek Ruppia was very abundant on a soft muddy

sand bottom. Water was brown and very turbid, but shallow. Salinity varied from 8.2 - 9.8 o/oo.

No attached plants were found from Port Sutton To Alafia River. South of this river Ruppia was rare. Diplanthera was found commonly near Big Bend, and Ruppia was abundant. Offshore within the one fathom curve Syringodium was abundant and Ruppia was sparse. Water was very turbid from Port Sutton to Big Bend, possibly a result of industrial pollution from Port Sutton and phosphate mining activities on the Alafia River. Salinity from Port Sutton to Big Bend varied from 5.2 - 16.3 o/oo. The very low reading was taken at the mouth of Alafia River.

An explanation for the lack of attached plants from Gadsden Point to Alafia River, except where previously noted, may lie in the extreme water turbidity in this area. The euphotic zone probably is so shallow that plants cannot grow on the shallow flats. If the water were sufficiently shallow in this area, plants would possibly be limited by extreme air exposure. Critical study is needed in this area, correlating light penetration, water turbidity, and plant occurrence. The presence of Ruppia north of Ballast Point on Bay-shore Blvd. flats in January 1961 gives credence to the belief that high water turbidities in summer depress growth.

Near Mangrove Point Ruppia was found in abundance. In Little Manatee River Ruppia was sparse. Immediately outside this river Syringodium was extremely abundant and formed a dense bottom coverage. Ruppia was rare, and Diplanthera and Thalassia were common. From Little Manatee River to Piney Point seagrass growth was relatively dense. At Piney Point water was turbid, but seemed to result from silt raised from the bottom by choppy water. Salinity from Mangrove Point to Piney Point varied from 15.6 - 21.8 o/oo.

In Terra Ceia Bay on 13 January 1959 Thalassia and Diplanthera were abundant, and Syringodium was sparse. Salinity was 23.2 o/oo.

Observations made during an aerial survey of the south shore of Tampa Bay on 21 December 1960 revealed that dense seagrass growth was present on flats from Terra Ceia Bay to Anna Maria Key.

All salinities taken seemed to be much lower than expected. As a result this survey reports extensive stands of Diplanthera and Syringodium in salinities lower than optimal. The spring and summer of 1960 produced an amount of precipitation much higher than normal. The survey was conducted almost one month after the passage of Hurricane "Donna", which brought additional precipitation. Salinity readings over the survey area after six months should show higher values, as did the one reading taken in January 1961 on flats off Bayshore Blvd. in Tampa.

Dominant amounts of Diplanthera occurred as far north as Big Island on the Pinellas County side of Tampa Bay. As previously mentioned, observed salinities do not explain why dominant stands of Diplanthera did not appear on Interbay Peninsula. Diplanthera again became dominant outside the mouth of Little Manatee River.

I have concluded that the offshore or depth distribution of seagrasses is largely controlled by water turbidity. All attached plants were limited to the waters inshore from the one fathom curve. The offshore distribution of Ruppia or Diplanthera and concomitant shoreward invasion of Syringodium probably is governed by the spring low tide line. It is generally true that Diplanthera is dominant in the southerly portions of Tampa Bay, while Ruppia is dominant in the most northerly portions. I believe that salinity is most influential in explaining the north-south distribution of the latter two species in Tampa Bay. The observed salinity gradient in Tampa Bay correlates with the north to south distribution of Diplanthera and Ruppia.

It must be remembered that observed salinities in Tampa Bay at the time of this survey was lower than normal. Any seeming discrepancy between salinities found during this survey, optimal salinities of plant growth, and observed plant distribution is insignificant. The prevailing mean salinity gradient of Tampa Bay would modify any discrepancy.

Several spoil banks in Hillsborough Bay were observed from the aspect of possible seagrass colonization of an artificially created habitat. No plant growth was found on the submerged portions of the spoil banks. The submerged portions of these banks were composed of hard compacted sand, with large pieces of rock and shell often found over the bottom. This type of bottom would possibly be unsuitable for seagrass growth, but no such conclusion can be drawn because the water is turbid. This turbidity complicates the picture. It is thought that turbidities here are similar to those found north of Ballast Point to McKay Bay.

All attached seagrasses found in Tampa Bay were growing on muddy sand bottom. The occasional sandy bottom encountered contained no plants. A better understanding of seagrass distribution would be facilitated by an extensive hydrographic survey of the area.

DISCUSSION

Several generalizations concerning seagrass growth in Tampa Bay may be made. Most notable is that growth was limited to bottom areas shoreward of the one fathom curve. High turbidity of Tampa Bay seemed the best explanation for this phenomenon. No Secchi disc or other light readings were attempted, but the water was extremely murky. This condition was more pronounced in summer than in winter. During the survey the bottom, even in the clearest water areas, could be seen only to a maximum of three and one-half feet. In winter the bottom most often could be seen to a depth of

six to seven feet. It is possible that grasses would grow in areas of Tampa Bay deeper than the one fathom curve if the water were as clear throughout the year as it is in winter. However, clear water is only prevalent for approximately three months. This possibly is not long enough to allow seagrass colonization. Even if it were, the winter water temperatures would militate against the establishment and growth of the tropical seagrasses.

Olson (1953) computed that Tampa Bay, including Old Tampa Bay and Hillsborough Bay, displayed a total bottom area of 319.1 square miles. The area under six feet in depth was 92.5 square miles, nearly one-third of the total area. This might seem a large proportion of a bay of this size, but rather small when considering that all seagrass growth is limited to this depth, and that dredging and filling is gradually reducing the area available for growth. The collective effect of "small" fills becomes evident.

On shallow flats two zones of grass growth were found. From shallowest areas near shore to approximately spring low tide level, either Ruppia maritima or Diplanthera wrightii was dominant. Growth of these genera was extremely patchy close to shore and became more dense and continuous away from shore as water depth increased. From spring low tide level to the edge of the one fathom curve a Syringodium filiforme zone of growth was found. I have earlier (Phillips, op. cit.) discussed seagrass zonation on shallow flats in Florida and pointed out that Syringodium will not tolerate intertidal air exposure. Ruppia and Diplanthera often occurred in the Syringodium zone, but were not dominant. With regard to Ruppia one exception to this offshore zonation was noted. During the survey Ruppia was dense on flats down to the one fathom curve north of Courtney-Campbell Parkway in Old Tampa Bay. Syringodium was absent. This contrasted with observations made in 1957-1958 in the same area which showed abundant Syringodium in its accustomed niche (below the intertidal zone). This dislocation of species is possibly a result of greatly reduced salinity. Mean annual salinity in Mobbly Bay, which is in this area, from 1957-1958 was 21.3 o/oo. During this survey average salinity

at 20 stations north of Courtney-Campbell Parkway was 11.4 o/oo (13.0 o/oo at three stations in Mobbly Bay). This reduction of salinity may have been sufficient to exclude Syringodium. Ruppia is favored by salinities about half that of normal sea water or less.

One other factor was conspicuous. Diplanthera was dominant on the west side of Tampa Bay to the north tip of Big Island while on Interbay Peninsula Ruppia generally was dominant from Gadsden Point to Old Tampa Bay north of Courtney-Campbell Parkway. This phenomenon does not seem to be related to salinity, as north of Gandy Bridge salinity was higher on Interbay Peninsula flats than on the opposite side. South of Gandy Bridge the reverse was true. Long term hydrographic studies would possibly reveal differences. The effects of Howard Frankland Bridge causeways, installed in 1958-1959, should be investigated as to salinity, current, and water depth.

From my previous work it seems that dominant Thalassia testudinum prefers a water salinity over 25.0 o/oo, and Syringodium a salinity over 20.0 o/oo to maintain persistent growths. It is thought that optimal salinities for Diplanthera are higher than 20.0 o/oo. However, in some areas large growths are found in areas with lower salinities. Here again, determinations should be made over a period of time since the low salinities encountered may have been temporary. It should also be pointed out, of course, that the presence in an area of a salinity optimum for any particular species does not insure that species being found there. Turbidity, for example, is only one of the factors that could exclude seagrasses even though salt content of the surrounding water might be favorable.

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LEGEND

Figure 1. Map of Tampa Bay with major topographic and natural configurations
indicated.