Acc# 2111

OYSTER STUDIES ALONG THE TEXAS COAST: 1968

Project MO-R-10

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ABSTRACT

Oyster (Crassostrea virginica) studies showed death rates to be low in Aransas and Galveston Bays but relatively high in Matagorda Bay. Initial mortality in Matagorda Bay was associated with fresh water and siltation but subsequent summer deaths were associated with Labyrinthomyxa infection.

The oyster harvest in all statistical districts dropped below that recorded in the previous season. For the first time in several years, however, a harvest was reported in Aransas Bay.

Market oyster stocks increased on Red Fish Bar in Galveston Bay but losses in oystering area were caused by spring flood waters. This, along with slightly lower fishing pressure and a reduction in harvest time caused by a February 1969 storm, contributed to the lower harvest in Galveston Bay.

INTRODUCTION

Studies of oyster (Crassostrea virginica) populations in several estuaries have been conducted for a number of years. Initially, such studies consisted of routine sampling of public reef stocks to assess changes affecting the harvest. Beginning in 1962 severe disease epidemics depleted oyster populations in the mid-coastal bays, emphasizing the need for special disease studies. Reef sampling was gradually discontinued and replaced with tray studies utilizing known oyster stocks to evaluate disease losses. Reef sampling was continued only in Galveston Bay where production, and fishing pressure, remained high.

In 1968 mortality studies were conducted in Galveston, Matagorda, and Aransas Bays. Reef sampling was continued on the major harvest centers in Galveston Bay. Results of the various studies are presented below.

MATERIALS AND METHODS

Tray stations in each estuary (Figure 1) were stocked with oysters of various sizes or ages. Oysters were held in vinyl-coated metal trays with hardware cloth tops. Stocks were measured at the beginning of the study and periodically thereafter. Stations were visited generally once a month; dead oysters were removed and measured, gaper tissues were cultured in fluid thioglycollate medium containing Mycostatin and Chloromycetin, fixed in Zenker's solution and preserved in alcohol. Occasional live oyster samples were collected and prepared in the same manner. Death rates were calculated on a monthly basis as per cent loss from the stock at the beginning of that month.

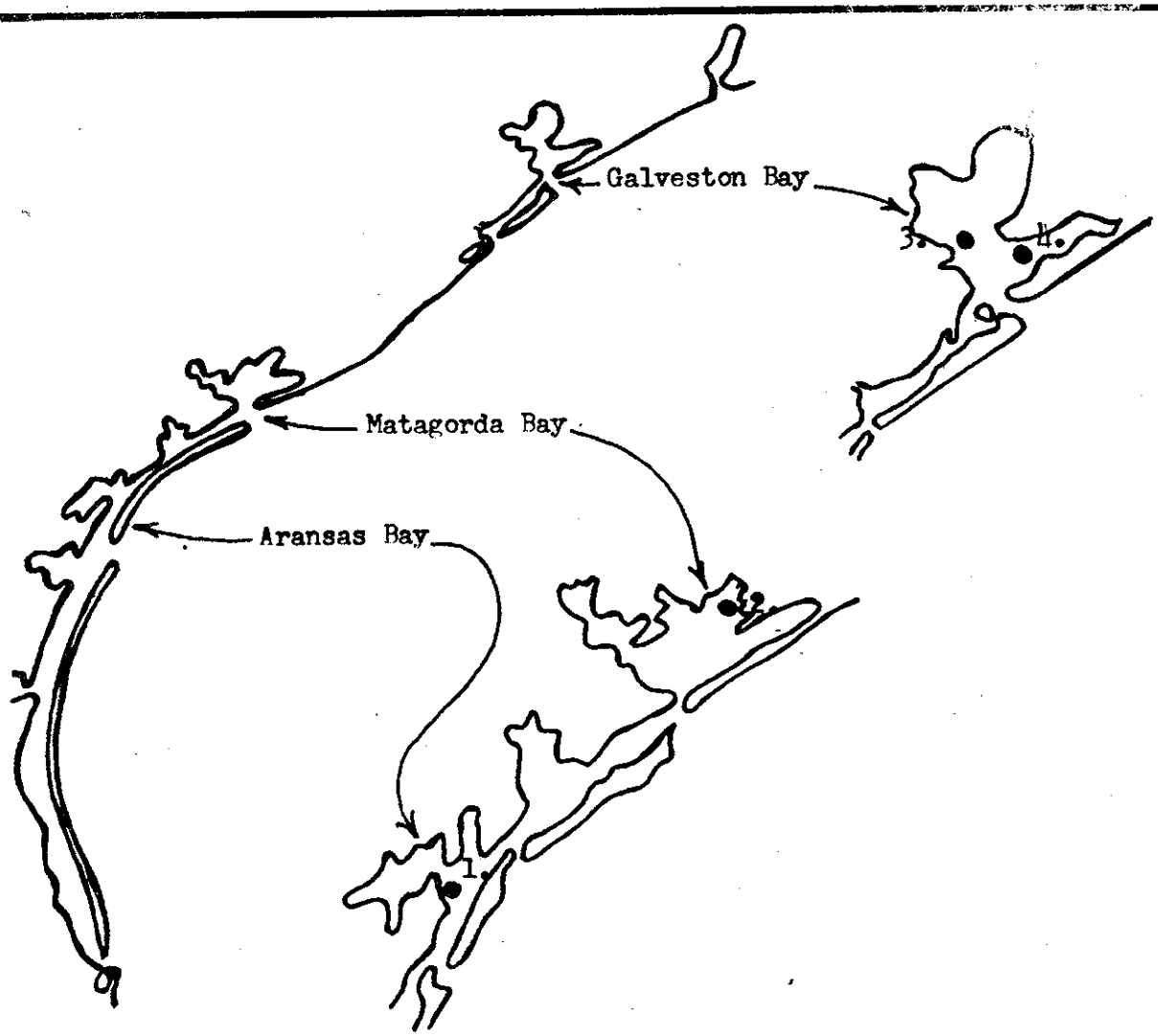

Figure 1: Map of Texas Coast showing location of oyster tray stations in use during 1968.

1. Half Moon Station
2. Coon Island Station
3. Switchover Station
4. Hanna Reef Station

Reef samples consisted of three standard bushels (2150 cubic inches per bushel) of unculled oysters dredged from Galveston Bay stations (Figure 2) at monthly intervals. Live oysters were culled out and measured to the nearest millimeter along the dorso-ventral axis of the right valve. Measurements were grouped into 25-millimeter intervals designated as spat (1-25 mm); seed (26-50 mm); sub-market (51-75 mm); small market (76-100 mm); medium market (101-125 mm); and large market (126-150 mm). Samples were grouped into quarterly intervals (January-March; April-June; July-September; October-December) designated as winter, spring, summer and fall. Ten market oysters from each sample were cultured in thioglycollate medium for Labyrinthomyxa infection. Infection incidence was based upon a 0-5 scale with very light infection = 0.5, light infection = 1.0, light to moderate = 2.0, moderate = 3.0, moderate to heavy = 4.0 and heavy infection = 5.0.

RESULTS

Oyster Mortality Studies

Aransas Bay

The Half-Moon station was stocked on February 16 with 525 oysters of the 1967 year class collected from Switchover Reef in Galveston Bay.

Monthly death rates were low (Table 1) with the maximum rate occuring in late spring (June). Increased mortality was associated with light Labyrinthomyxa infections although the incidence did not exceed 1.0 in live oyster samples throughout the year. Only in July and October were all sample oysters found to be infected.

Although salinity and temperature increased in summer, mortality appeared to reach a peak in late spring and did not show the typical late summer peak commonly associated with Labyrinthomyxa.

Low mortality contrasted with that of the preceeding year when most of the stock had died by May, presumably due to "Aransas Bay disease" (Hofstetter, 1968), but was similar to that of another wet year in 1966 (Hofstetter, 1967).

Matagorda Bay

The Coon Island station was stocked with 1000 Tres Palacios Bay oysters on April 15. These were of mixed year classes but most were probably 1967 year class oysters.

Initial mortality was high (Table 2) and relatively high death rates continued through summer and early fall. Spring mortalities were associated with low salinity and light Labyrinthomyxa infections. Fresh water and siltation due to heavy, local rainfall may have been primary factors in the spring deaths. In late summer and early fall, however, mortality was associated with increasing salinity and an increasing incidence of Labyrinthomyxa. The peak infection incidence in October coincided with the peak fall death rate. The incidence remained above epidemic levels through December, but death rates decreased sharply as water temperatures cooled in November.

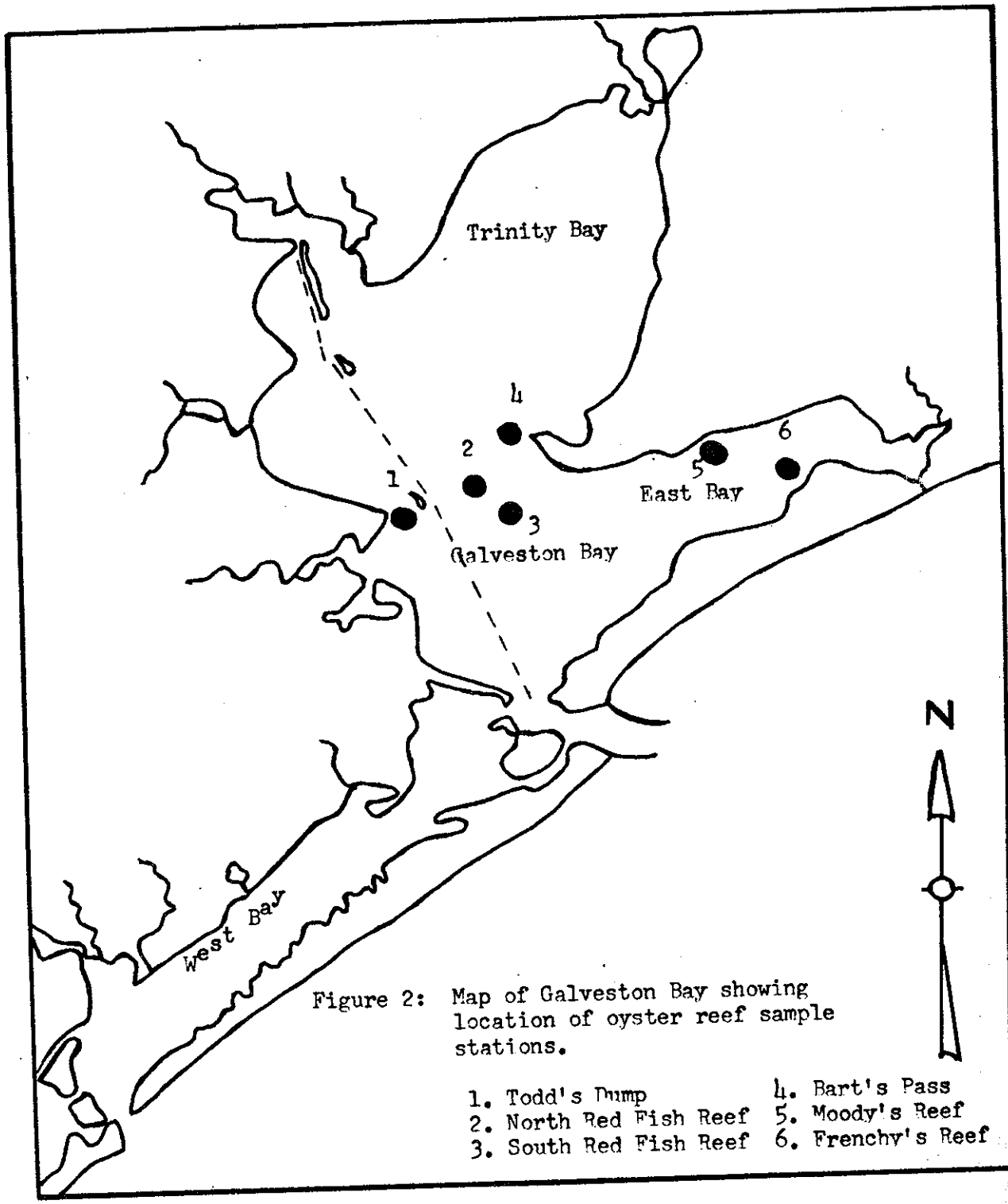

Figure 2: Map of Galveston Bay showing location of oyster reef sample stations.

1. Todd's Dump
2. North Red Fish Reef
3. South Red Fish Reef
4. Bart's Pass
5. Moody's Reef
6. Frenchy's Reef

Table 1: Monthly mortalities among Half Moon station oysters in Aransas Bay during 1968

Month	Salinity °/oo	Temperature °C	Oyster Stock Live	Dead	Mortality Rate %
January					
February					
March	9	12	525	2	0.4
April	14	24	513	5	1.0
May	17	24	528	6	1.1
June	6	28	513	33	6.4
July	4	28	470	5	1.1
August	5	30	511	9	1.8
September	17	28	497	0	0
October	10	28	487	3	0.6
November	12	13	473	8	1.7
December	19	11	432	5	1.2

Table 2: Monthly mortalities among Coon Island station oysters in Tres Palacios Bay during 1968

Month	Salinity °/oo	Temperature °C	Oyster Stock Live	Dead	Mortality Rate %
January	24	8			
February	16	14			
March	24	22			
April	16	22			
May	0	27	1000	273	27.3
June	4	28	717	196	27.3
July	6	30	521	60	11.5
August	14	30	461	45	9.8
September	20	28	416	51	12.2
October	14	26	365	74	20.3
November	17	17	291	16	5.5
December	20	12	275	7	2.5

Galveston Bay

Oyster stocks at Switchover and Hanna Reef stations consisted of survivors of 1965, 1966 and 1967 year class oysters. The 1965 group was present only at Hanna Reef; those at Switchover Reef were stolen in January.

Peak monthly death rates occurred in April among all three year classes (Table 3) but even then were relatively low (3.5-5.4%). Death rates dropped in June, along with reduced salinity due to Trinity River flooding, and remained under 2 per cent per month for the rest of the year even though salinity increased and water temperatures reached summer peaks. Annual death rates were approximately 18 per cent among the 1965 year-class, 12 per cent among the 1966 year-class and 19 per cent among the 1967 year class oysters.

The incidence of Labrinthomyxa among gapers was highest in spring and among the 1965 year-class. Incidence in summer (when salinity was low) was the lowest of any season. Labyrinthomyxa did not appear to be a prime factor in the slightly higher mortality among the youngest, 1967 year-class.

Reef Sampling in Galveston Bay

Oyster Population Trends

Peak oyster spat setting was not observed until August and was light at all stations except Bart's Pass (Table 4). Poor survival along with very light setting prevailed at the East Bay stations.

Seed and sub-market oyster stocks decreased at all stations through summer. Fall recruitment of spat replenished seed stock at Red Fish Bar stations but not the sub-market stock. At East Bay stations seed stock decreased noticeably in spring samples and the decrease continued throughout the year. Sub-market stocks also decreased, but more gradually, in the East Bay samples.

Market oyster stocks showed a decline at Red Fish Bar until fall. This was due to loss of market oysters at Bart's Pass caused by Trinity River flooding; market stocks actually increased at other Red Fish Bar stations during the year. East Bay market oyster stocks showed little change until fall when a reduction in sample abundance occurred.

Labyrinthomyxa Incidence

Labyrinthomyxa infection incidence among market oysters on Red Fish Bar and in East Bay increased in spring, but unlike previous years, decreased in summer following reduced salinity (Table 5). At Red Fish Bar stations, peak infections were not found until October; whereas peak infections at East Bay stations occurred in May. Aside from the peak monthly infections, the incidence was below epidemic level, and Labyrinthomyxa was not believed to be an important factor in mortality.

The Oyster Fishery

Oyster production during the 1968-69 season (using November through April data) decreased, as in past years, from the upper coast to the lower coast (Table 6). Compared to the previous season, the harvest in each district declined.

Table 3: Monthly mortalities among three year-classes of oysters at Hanna and Switchover stations in Galveston Bay during 1968

Month	Salinity °/oo	Temp. °C	1965 CLASS Live	1965 CLASS Dead	1965 CLASS Mort. %	1966 CLASS Live	1966 CLASS Dead	1966 CLASS Mort. %	1967 CLASS Live	1967 CLASS Dead	1967 CLASS Mort. %
January	16	10	460	6	1.3	1451	8	0.6	1662	35	2.1
February	17	13	454	4	0.9	1440	8	0.6	1628	21	1.3
March	20	17	450	5	1.1	1432	17	1.2	1604	16	1.0
April	9	23	445	24	5.4	1415	50	3.5	1588	69	4.3
May	6	26	419	22	5.3	1363	23	1.7	1519	64	4.2
June	4	28	397	6	1.5	1340	17	1.3	1455	37	2.5
July	4	29	391	5	1.3	1323	19	1.4	1412	23	1.6
August	10	30	386	3	0.8	1304	7	0.5	1389	18	1.3
September	14	26	383	4	1.0	1297	7	0.5	1371	11	0.8
October	15	23	378	4	1.1	1290	8	0.6	1359	13	1.0
November	20	14	374	2	0.5	1282	3	0.2	1346	10	0.7
December	19	13	372	0	0	1279	4	0.3	1334	3	0.2

Table 4: Average number of oysters per barrel sample per quarter collected at Red Fish Bar and East Bay stations during 1968.

Area	Size (mm)	Quarter W	SP	S	F
Red Fish Bar	1 - 25	25	9	112	47
	26 - 50	177	124	80	174
	51 - 75	284	261	187	163
	76 - 100	88	82	61	97
	101 - 125	11	7	8	9
	126 - 150	4	2	2	1
East Bay	1 - 25	90	22	10	2
	26 - 50	164	46	29	14
	51 - 75	80	66	56	31
	76 - 100	35	38	36	28
	101 - 125	8	10	7	6
	126 - 150	2	2	1	1

Table 5: Weighted incidence of Labyrinthomyxa among market oyster stocks at Red Fish Bar and East Bay stations in 1968

Area	Reef Station	Quarter W	SP	S	F
Red Fish Bar	Todd's Dump	0.8	1.3	1.0	1.5
	N. Red Fish	0.6	0.9	0.2	1.3
	S. Red Fish	1.0	0.9	1.2	1.9
	Bart's Pass	0.2	0.1	0.0	-
East Bay	Frenchy's	0.8	1.6	0.5	0.5
	Moody's	1.3	1.4	0.4	1.1

Table 6: Oyster production (barrels) along the Texas Coast during the 1968-69 season.

Month	Production in Barrels by Statistical District			
	Galveston	Matagorda	Aransas	Laguna
November '68	19,209	1,021	95	0
December	35,168	1,265	418	6
January '69	37,458	2,015	203	11
February	14,232	2,852	263	16
March	22,109	3,132	436	11
April	13,277	1,008	599	4
Total: 1968-69	141,453	11,293	2,014	48
Total: 1967-68	146,893	18,365	9,876	121
Total: 1966-67	170,842	17,122	35,164	640

Galveston Bay: Season opened November 15, colsed May 1.

Matagorda Bay: Season opened September 1, closed May 1.

San Antonio Bay: No open season. Closed by proclamation of the Parks & Wildlife Commission.

Aransas Bay: Season opened September 1, closed May 1.

South Bay: No closed season.

In the Aransas district, unlike previous years, all reported production came from Aransas Bay, none from San Antonio Bay. Because of widespread destruction of oysters due to flood waters from Hurricane Beulah (1967) as well as continual flooding in the spring 1968, San Antonio Bay was closed to oystering by proclamation of the Parks and Wildlife Commission.

In Galveston Bay the harvest was lower (96%) than that reported in the previous season. Part of the reduction could be attributed to a shortened season. Because of storm damage to shore installations and sewage treatment plants during a February (1969) storm, the State Health Department closed the bay completely from February 15 to March 1 when a small portion was opened (which did not include the major harvest centers). Not until March 8 was the bay reopened to the original boundary lines.

Boat counts were insufficient to provide more than general trend in the Galveston Bay fishery. Based upon such counts, fewer dredge boats worked the reefs than in the 1967-68 season (an average of 55 per day compared to 60 in the previous season). Because of Trinity River flood kills, Bart's Pass and the eastern edge of the Humble Oil and Refining Company "A" Lease area produced no market oysters. Few boats worked in East Bay, mostly in the Frenchy Reef area. As in past years the majority of the dredge boats worked South Red Fish Reef, The Humble "A" Lease, and North Red Fish Reef. At the beginning of the season, Todd's Dump was fished moderately, but by the end of the season few dredge boats worked the reef. It was not uncommon, however, to see a number of the smaller hand dredge boats working Todd's Dump and the adjacent artificial reef, Switchover. Other artificial reefs worked during the season included Eagle Point, Range Light, Triangle, Missing, and Gas Pipe. Trinity Bay reefs did not produce market oysters during the season.

DISCUSSION

Low mortality rates among Aransas Bay oyster stocks permitted a small commercial harvest for the first time in several seasons. Production, however, appears to be possible only when salinity remains below 20 parts per thousand for an extended time period. At such levels, neither Labyrinthomyxa nor "Aransas Bay disease" reach epidemic proportions.

Relatively high mortality rates among oysters in Matagorda Bay were reflected in the reduced harvest. Initial (late spring) mortality was associated with flood waters and siltation. Subsequent (late summer) mortality was associated with epidemic levels of Labyrinthomyxa. However, death rates were not as high as those observed in Matagorda and San Antonio Bay in recent years which were also associated with epidemic Labyrinthomyxa infection.

Low mortality again prevailed among three year classes of oysters in Galveston Bay as flooding reduced salinity and curtailed Labyrinthomyxa infections. However, flood waters destroyed market oyster stocks along the eastern shore (Bart's Pass), and East Bay stocks continued to decline, thus reducing the productive harvest area. In addition, harvest time was reduced by a three week closure in mid-season. In spite of these reductions in both oystering area and harvest time, production dropped only slightly below that of the 1967-68 season.

LITERATURE CITED

Hofstetter, R. P. 1967. Oyster mortality studies along the Texas Coast during 1966. Coastal Fisheries Project Reports (1966), Texas Parks & Wildlife Department.

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