

Acc#293

Project Report

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Project No. M-2-R-2 Date 15 December 1960.
Project Name: An Ecological Survey of Area M-2.
Period Covered: 1 November 1959 to 1 November 1960. Job No. A-2

Collection and Identification of Vertebrate Forms Present in Area M-2 and
Determine Their Relative Seasonal Abundance.

Objective: To determine the vertebrate forms present, periods of presence
and relative seasonal abundance in Area M-2.

Procedures: The vertebrate population was sampled bi-monthly at thirteen
trawl and two bar-seine stations established in November 1959. The trawl
stations were sampled with a trawl that was 12 feet along the lead line with
1-3/8 inch stretch mesh and a 1/2 inch stretch mesh liner attached to the cod
end, and a 10 foot trawl with 1 1/4 inch stretch mesh and a 1/2 inch stretch mesh
liner attached to the cod end. The bar-seine used had a 1/8 inch stretch mesh
and was used to sample the juvenile fish in the shallow nursery areas. A trammel
net, gill net, rod and reel, plankton net, 10 and 20 foot minnow seines, 60 foot
bag seine, and a bottom dredge were used to supplement the trawl and bar seine
data. All the stations are shown in Figure I.

All the fish caught were measured to the nearest millimeter in standard
length. If numerous individuals of one species were collected, a representative
number were measured and the total amount calculated or counted. Fish of sports
value were weighed, measured, and tagged for growth and migration studies.

Findings: Eighty-two species of vertebrates were collected from October
1959 to November 1960. A total of 62,539 vertebrates were taken in 404 collec-
tions, which is an average of 154 vertebrates per collection. These figures
show the bay as relatively productive as far as the vertebrate population is
concerned. All the species collected were compiled into a checklist with per-
tinent hydrographic data and relative abundance per month included for each
species. The checklist is presented in Table 1.

Salinity was an important factor determining the abundance and distribution
of vertebrate species collected in Area M-2. This year excessive rains and
flooding rivers, creeks and bayous poured varying amounts of fresh water into
the bay, thus lowering the salinity and allowing many fresh water vertebrates
access to the bay. The fauna has been found to vary from high salinity species
in one part of the bay to fresh water species in another area. Another inter-
esting observation was that numerous marine species, especially juveniles,
were able to withstand sudden salinity changes. Some were taken in the same
trawl collection with fresh water forms. The fresh water species caught in
Area M-2 during the study were Ameiurus melas, Ictalurus f. furcatus, Ictalurus
p. punctatus, Ictiobus bubalus, Cyprino carpio, Lepomis microlophus, Pomoxis
annularis, and Aphredoderus sayanus gibbissus. These fish were caught in a
salinity less than 4.0 parts per mille. Marine species that were caught in
this same salinity range were Anchoa mitchelli, Brevoortia patronus, Bagre marinus
Galiechthys felis, Mugil cephalus, Polydactylus octonemus, Bairdella chrysura,
Caranx hippos, Cynoscion arenarius, Leiostomus xanthurus, Membras martinica,
Menidia beryllina, Micropogon undulatus, Pogonias cromis, Prionotus tribulus,
Achirus lineatus, Citharichthys spilopterus, and Trinectes maculatus.

Water temperature was a second important factor governing the occurrence of certain vertebrates in the area. A few species, such as Rissola marginata, were collected only during the cold months of the year. On the other hand, Polydactylus octonemus and Bagre marina are examples of species that move in during the warmer months. To check the effects of salinity and temperature on species occurrence and abundance refer to the checklist.

Eight species of fish were collected in the area all twelve months. There are other species considered year round dwellers in Area M-2 that may have been missed some months.

GAME FISH OF AREA M-2.

The tremendous amount of sportsfishing pressure in Area M-2 makes a life history study of the major game fish imperative. Data pertaining to the major species are outlined in the following discussion. Although this data is incomplete for determining exact life histories in relation to Area M-2, it offers some information toward achieving this goal.

Cynoscion nebulosus (Cuvier) Speckled Trout. Only eight specimens were caught during this project year. (See Table 1 for occurrence and hydrographic data pertaining to this species.) The chief methods of catching this species were with trammel and gill nets. Juvenile specimens were caught in September 1960 by seining in Ruppia beds. The importance of this marine grass as a habitat area for young speckled trout can not be over emphasized. As this plant is the only marine grass found in Area M-2, man's abuse of it must be checked in order to protect the nursery area.

The large speckled trout caught were measured, weighed and tagged for growth and migration studies.

June, September and October 1960 were the months of reported trout mortalities in Area M-2. Some fish were examined for external and internal evidence that would give a clue to the mass mortalities. However, no such evidence could be found.

Excessive rains and flooding creeks, rivers and bayous were common occurrences during this period which increased the flow of the Houston Ship Channel into the bay. The channel water, containing industrial waste, caused a sudden drop in the dissolved oxygen concentration in the bay and may have polluted the bay at this time. Both factors may account for the trout mortalities.

Pogonias cromis (Linnaeus) Black Drum. This species was collected every month of this study except February 1960. A total of fifty drum were collected this project year. (Table 1) The large drum were generally caught in the trawl and trammel net in the open bay. Juvenile specimens were taken while seining around Spartina in the marsh habitats.

All large drum caught were weighed, measured and tagged for growth and migration studies. One tag was returned by a local sports fisherman in August 1960. The drum, tagged on April 1960 at Vingtune Island, was caught approximately six miles away at Fisher's Shoal. No valid conclusions could be drawn from the limited data given by the fisherman.

Drum mortalities also occurred in June, September and October 1960. These kills occurred when the Houston Ship Channel was flushing into the bay.

Paralichthys lethostigma Jordan and Gilbert. Southern Flounder. A total of seventy-one flounder was taken during eight months of the year. Occurrence and pertinent hydrographic data pertaining to this species can be found in the checklist (Table 1).

Juvenile flounder first appeared in the seine collections the latter part of May 1960, and continued to show up in the collections all summer. All specimens under 60 mm standard length were collected by seine in Clear Lake, Mud Lake and Taylor Lake. These collections indicate that young flounder prefer shallow nursery grounds with muddy bottoms. Flounder over 100 mm standard length were not collected in the low salinity waters of Mud and Taylor Lakes.

All larger flounder collected were weighed, measured and tagged for growth and migration studies.

Flounder mortalities were reported only once this year in Area M-2. This kill occurred between Morgan's Point and Scott's Reef on June 28, 1960. The chemical odor peculiar to the Ship Channel was evident and a chemical analysis run on the water showed the dissolved oxygen concentration to be 3.5 parts per mille.

Sciaenops ocellatus (Linnaeus) Red Fish. Only three red fish were collected in Area M-2 this year. Two specimens were caught at Vingtune Island in the trammel net in April 1960, and one specimen was caught at Five Mile Pass in the shrimp trawl in October 1960.

All the red fish caught were weighed, measured and tagged for growth and migration studies.

Archosargus probatocephalus (Walbaum) Sheepshead. Thirty-five sheepshead were collected in the trawl and trammel net this year around oyster reefs and vegetated area. The majority of the fish were collected in the trawl.

The larger sheepshead were tagged for growth and migration studies.

Cynoscion arenarius Ginsburg. Sand Trout. This is the only game fish collected every month of this study. A total of 1,211 sand trout were collected this year, an average of 3 fish per collection. (See Table 1)

Sand trout under 100 mm were taken every month except February 1960. The peak months of spawning, according to the collection records, occurred from May through August in Area M-2. Juvenile sand trout were not restricted to any particular type habitat as other juvenile species seem to be. They were caught in the trawl at all stations in the bay.

All large sand trout caught were weighed, measured and tagged for growth and migration studies.

Mortalities in the sand trout population occurred in June, September and October 1960. These fish kills were reported from Morgan's Point to the Trinity River, and were probably caused by the ship channel water in the bay.

NEW SPECIES COLLECTED IN AREA M-2

Several new vertebrate species were collected that were not found in the 1958 through 59 survey of Area M-2. These are listed with notes on abundance and occurrence.

Rhinoptera bonasus. One specimen of the cow-nosed ray was caught at Fishers Shoal in October 1960.

Opisthonema oglinum. One specimen was taken at Station G, in the ship channel, in August 1960.

Ictiobus bubalus. The small mouth buffalo was collected during a period of low salinity at Fisher's Shoal in January 1960.

Cyprinus carpio. Another freshwater species caught at Cedar Bayou in July 1960.

Aphredoderus sayanus g. The pirate perch was caught at Station C in April 1960 during a period of low salinity.

Hypsoblennius ianthus. This species was collected in relatively high salinity around oyster reefs in the vicinity of Red Fish Island from November to March.

Lepomis microlophus. The red eared sunfish was collected in Mud Lake in July 1960.

Microgobius gulosus. The large mouth goby was collected in Mud and Taylor Lakes from May through September 1960.

Orthopristes chrysopterus. One specimen of the pig fish was collected in the trammel net at Vingtune Island in October 1960.

Ancyclopsetta quadrocellata. A specimen of the ocellated fluke was collected in the ship channel at Five Mile Pass in February 1960.

Echeneis naucrates. This remora was attached to the Rhinoptera bonasus that was collected at Fisher's Shoal in October 1960.

Comments: The game fish most affected by the polyhaline conditions in Area M-2 were trout and red fish. Other factors, such as turbidity and the sparcity of marine vegetation contributed to the limitations in their occurrence and abundance. The majority of the vertebrate collections were generally made up of croakers, spot, menhaden, anchovies and sand trout.

It is quite obvious, on the basis of the data collected during this year, that Area M-2 was more important as a nursery area for juvenile fish than as a habitat for the larger game fish. If the juvenile population shows a similar trend next year and the hydrographic conditions are stable, there should be plenty of forage fish on which the large game fish can feed.

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Date 12 January 1961

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Table 1

Vertebrate Collection (Average Number of Vertebrates Taken Per Collection)

	N	D	J	F	M	A	M	J	J	A	S	O	Size Range mm	o/oo Sal. Range	Temp Range
<i>Carcharhinus leucas</i> (Mull. & Hen.)								.07		.02			620-670	6-10.0	30-32.0
<i>Dasyatis sabina</i> (Le Sueur)			.04			.09		.02	.03	.03	.10		.03 160-370	7-15.0	12-31.0
<i>Rhinoptera bonasus</i> (Mitchell)												.03	.03 600	12.2	26.4
<i>Lepisosteus osseus</i> leptorhynchus Girard						.03							605	7.54	26.8
<i>Lepisosteus spatula</i> Lacepede	.03					.18		.02		.06		.03	.03 450-900	3-15.0	12-30.0
<i>Anchoa hepsetus</i> (Bonnaterre)										.03	.02		40-50	5.0	31.0
<i>Anchoa mitchelli</i> diaphana Hildebrand 41	48	42	25	23	31	30	19	22	17.5	13	8.7		10-60	0.2-21.24	6-35.0
<i>Brevoortia patronus</i> Goode	5.7	3.7	25	3.9	6.6	5.2	1.5	7.3	13	6.3	2.5	2.5	20-210	0.2-21.24	6-35.0
<i>Dorosoma cepedianum</i> (Le Sueur)			.25	.24	.68		.27	.03				.03	.03 40-220	0.5-15.0	9-31.0
<i>Dorosoma petenense</i> (Gunther)			.04	.20	.30		.02		.02	.13	.3		40-100	1.0-17.0	10-30.5
<i>Elops saurus</i> Linnaeus							.07	.02		.02			90-260	9-17.0	29-30.0
<i>Opisthonema oglinum</i> (Le Sueur)									.03				76	15.0	29.0
<i>Synodus foetens</i> Linnaeus	.16	.08										.08	100-250	9-15.0	9-25.0
<i>Ameiurus melas</i> Rafinesque												.03	.03 70	2.5	16.6
<i>Ictalurus f. furcatus</i> (Le Sueur)					.06		.03						60-120	1-3.0	15-28.0
<i>Ictalurus p. punctatus</i> (Rafinesque)			.03	.08			.13						20-220	1-1.5	10-31.0
<i>Bagre marina</i> (Mitchell)						.15	.04	1.2	7.1	6.6	1.4		50-420	1-19.0	24-31.0
<i>Galeichthys felis</i> (Linnaeus)	5.2	.83	.07	.40	.42	1	1.1	1.3	7	25	13.5		20-330	0.2-21.24	6-35.0
<i>Ictiolum bubalus</i> (Rafinesque)			.03										300	.03	8.0

Table 1 - Continued

	N	D	J	F	M	A	M	J	J	A	S	O	Size Range mm	o/oo Sal. Range	Co Temp. Range.
<i>Cyprinus carpio</i> Linnaeus								.03					42	3.25	31.0
<i>Myrophis punctatus</i> Lutken		.03		.04		.06							180-250	.3-13.3	11-23.0
<i>Urophycis floridanus</i> Bean & Dresel		.02	.03		.02								80-90	1-12.0	12-14.0
<i>Strongylura marina</i> (Walbaum)					.04			.03					100-190	3-17.0	29-34.0
<i>Syngnathus floridae</i> (Jordan & Gilbert)		.03										.03	100-250	12-19.0	10-27.0
<i>Syngnathus scovelli</i> (Evermann & Marsh)								.03					103	9.37	25.0
<i>Adina xenica</i> (Jordan & Gilbert)				.04	.27								20-40	3-9	12.0
<i>Cyprinodon variegatus</i> Lacepede	.03	.20	.75	.43	7.5			.31				.57	10-50	3-18.0	9-34.0
<i>Fundulus grandis</i> Baird & Girard		.06	.03	.28	1.36			.31			.18	.08	10-50	.4-17.0	5-30.0
<i>Fundulus similis</i> (Baird & Girard)								.02	.03				30-100	11-16.0	25-30.0
<i>Gambusia affinis</i> (Baird & Girard)	.03							.22		.02			20-30	10.0	13.0
<i>Lucania parva</i> venusta Girard				.09						.02			20-40	.6-14.0	13-30.0
<i>Mollénisia latipinna</i> Le Sueur	.14			.07	.03					.46			20-60	.5-17.0	9-25.0
<i>Aphredoderus sayanus</i> gibbosus (Le Sueur)					.03								66	.3	17.5
<i>Mugil cephalus</i> Linnaeus	.74	1.0	2.3	1.8	4.5	1.1	.03	.24	.06	.26			20-400	0.2-22.0	6-35.0
<i>Polydactylus octonemus</i> (Girard)					.06	.24	11	8.8	10	1.7	1		20-120	1-17.0	12-32.0
<i>Archosargus probatocephalus</i> (Walbaum)	.32				.03			.41	.03	.03	.02	.08	50-380	7-15.0	25-31.0
<i>Bairdella chrysura</i> (Lacepede)	.19	.20	.36	.04	.03			.04	.22	.02	.02	.08	30-200	2-17.0	11-32.0

Table 1 Continued

	N	D	J	F	M	A	M	J	J	A	S	0	Size Range mm	o/oo Sal. Range	C° Temp Range
<i>Caranx hippos</i> (Linnaeus)									.09				30-60	2-4.0	28-32.0
<i>Centropristes philadelphicus</i> (Linnaeus)	.09												90-170	9.0	9.0
<i>Chaenobryttus gulosus</i> (Cuvier).	.03	.03											.03 40-100	5-9.0	13-24.0
<i>Chaetodipterus faber</i> (Broussonet)	.81	.31	.04				.06	.04	.03	.06	.02	.8	20-110	7-15.0	12-30.0
<i>Chloroscombrus chrysurus</i> (Linnaeus)												.03	40	17-19.0	25.0
<i>Cynoscion arenarius</i> Ginsburg	3.3	2.8	1.8	.20	.04	.20	2.5	1.8	8.3	8.9	3.6	3	10-260	.2-22.0	6-35.0
<i>Cynoscion nebulosus</i> (Cuvier)	.03	.03	.04	.02					.03	.08	.03	.08	.03 50-500	8-13.0	13-30.0
<i>Gobionellus boleosoma</i> (Jordan & Gilbert)			.07										30	5.0	12.0
<i>Gobionellus hastatus</i> (Girard)	.03	.11			.07	.03	.07					.08	30-170	10-19.0	13-29.0
<i>Gobiosoma bosci</i> (Lacepede)	.26	.03	.04	.02	.03	.03	.03	.04	.03	.16	.03	.16	.03 10-40	1-15.0	11-31.0
<i>Hypsoblennius ianthus</i> (Jordan & Gilbert)	.03	.03	.03	.17									50-80	9-15.0	10-13.0
<i>Lagodon rhomboides</i> (Linnaeus)	1	.06	.10	.04	.14	.09	.03	.14	.03	.03	.71		30-170	5-15.0	11-30.0
<i>Leiostomus xanthurus</i> Lacepede	3.9	2.1	.79	.60	5.9	.90	5.4	14	16.8	4.5	5	3.6	10-230	3-22.0	6-35.0
<i>Lepomis microlophus</i> (Gunther)								.03					62	1.5	30.0
<i>Membras martinica</i> (Valenciennes)							.09		.41	.05			20-55	3-11.0	30.0
<i>Menidia beryllina</i> (Cope)	1.4	.03	.64	1.9	.55				.16	1.17	20-70			1-17.0	12-30.0
<i>Menticirrhus americanus</i> (Linnaeus)	.61	1.6	1.1	.16	.02		.03	.04	.03	.12	.92	.11	15-200	5-19.0	10-30.0

Table 1 - Continued

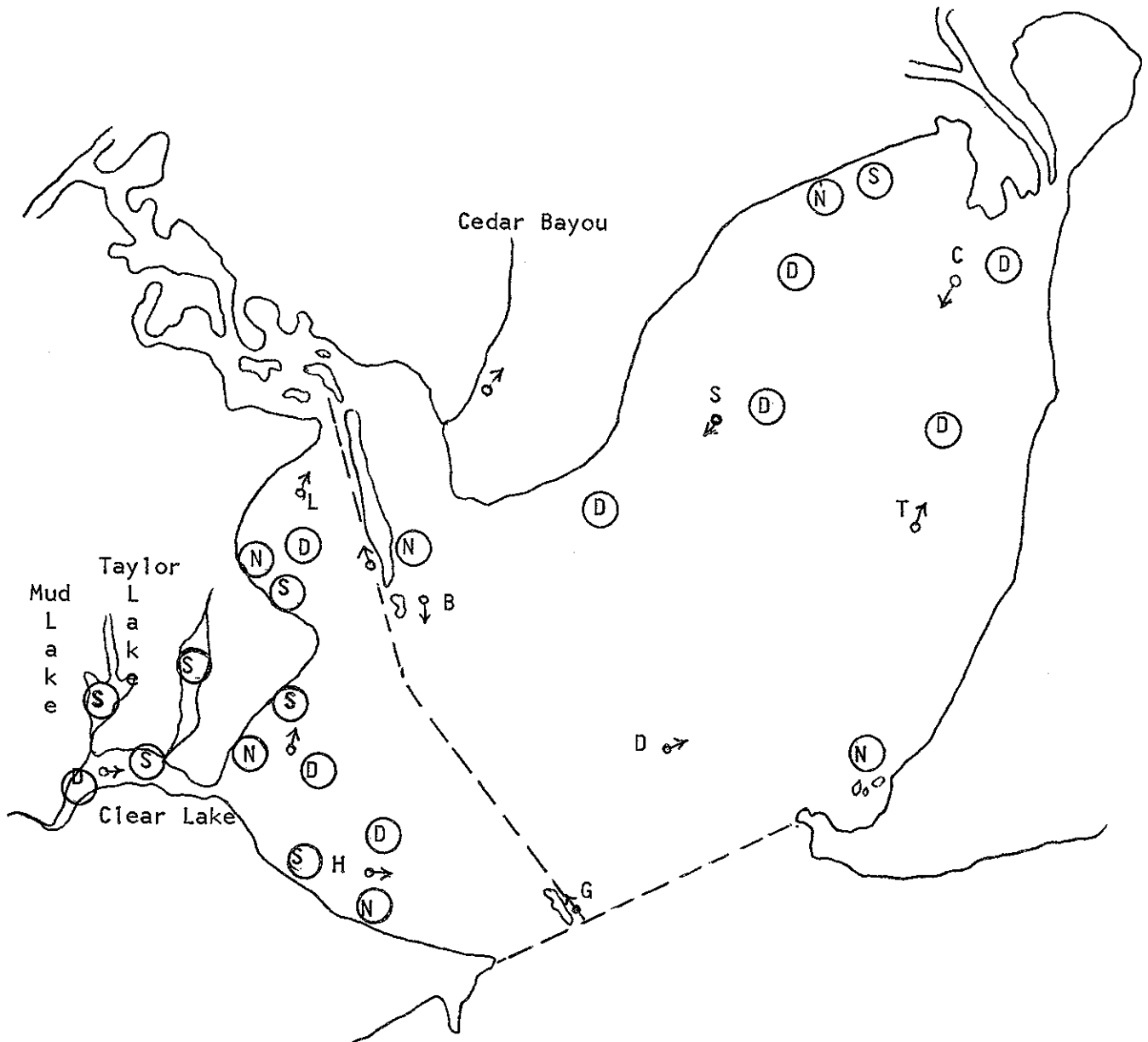
	N	D	J	F	M	A	M	J	J	A	S	O	Size Range mm	o/oo Sal. Range	C° Temp. Range
<i>Microgobius gulosus</i> (Girard)							.06	.17	.32	.77	.08		15-50	1-13.0	27-31.0
<i>Micropogon undulatus</i> (Linnaeus)	10.5	12.6	27.6	24.0	31.6	56	68	42	58	21.4	5.3	5.5	10-300	.2-22.0	6-35.0
<i>Oligoplites saurus</i> (Bloch & Schneider)										.03	.02		30-40	10.0	30.0
<i>Orthopristes chrysopterus</i> (Linnaeus)												.03	170	12.0	27.0
<i>Peprilus paru</i> (Linnaeus)												.03	60	19.0	26.0
<i>Pogonias cromis</i> (Linnaeus)	.16	.11	.50		.07	.30	.03	.02	.03	.03	.16	.08	50-500	5-19.0	7-30.0
<i>Pomoxis annularis</i> Rafinesque					.02								60	.5	13.0
<i>Poronotus triacanthus</i> (Peck)		.02					.03						50-90	8-14.0	12-25.0
<i>Prionotus tribulus</i> (Cuvier)	.06	.23	.07	.08	.19	.30	.06			.02	.4		20-70	3-15.0	9-25.0
<i>Rissola marginata</i> (De Kay)		.03			.02								60-80	9-11.0	10-14.0
<i>Sciaenops ocellata</i> (Linnaeus)						.06						.03	300-380	7-19.0	25-27.0
<i>Scomberomorus maculatus</i> (Mitchell)	.03												130	10.0	13.0
<i>Stellifer lanceolatus</i> (Holbrook)	3	4.8	.5		.15	.94	.75	6.8	2.3	1.9	4.1		10-100	8-19.0	8-30.0
<i>Trichiurus lepturus</i> Linnaeus					.06	.12	.04		.03	.02	.03	.03	200-400	13-17.0	19-30.0
<i>Vomer setapinnis</i> (Mitchell)	.06												50-70	13.0	15.0
<i>Achirus lineatus</i> (Linnaeus)	.03	.03	.04						.18	.34	.95		20-50	3-19.0	12-30.0
<i>Ancylorsetta quadrocellata</i> (Gill)			.04										50	12.0	11.0
<i>Citharichthys spilopterus</i> Gunther	.9	2.4	.86	.08	.03	.4	1.1	.52	.35	.29	.43		20-110	.2-22.0	6-35.0
<i>Paralichthys lethostigma</i> Jordan and Gilbert	.06	.05	.03		.07	.30	.06	.41	.68	.03	.16	.17	10-280	5-22.0	5-30.0

Table 1 - Continued

	N	D	J	F	M	A	M	J	J	A	S	O	Size Range mm	o/oo Sal. Range	Co Temp. Range
<i>Symphurus plagiusa</i> (Linnaeus)	.35	2.3	3		.07	.30	.06	.41	.68	.03	.16	.17	10-280	5-22.0	5-30.0
<i>Trinectes maculatus</i> (Bloch)	.9	2.3	3.5	3.1	1.5	.60	.40	.19	.58	.56	.23	.40	20-120	2-22.0	5-35.0
<i>Echeneis naucrates</i> Linnaeus												.03	103	10.0	25.0
<i>Spherooides nephalus</i> (Goode and Bean)	.30	.08					.12	.02	.19	.41	.75	.49	15-90	6-19.0	12-30.0
<i>Gobiesox strumosus</i> Cope		.03	.03	.04	.05								60-90	9-12.0	11-30.0
<i>Opsanus beta</i> (Goode & Bean)						.06							30-120	9.0	19.0
<i>Porichthys porosissimus</i> (Cuvier & Valenciennes)	.06	.02		.04			.06			.06		.34	15-120	9-19.0	11-30.0
<i>Tursiops truncatus</i> (Montague) (Bottled-nosed porpoise observed at Station G)														8.17	30.0

Number of Collections Per Month	31	35	28	25	41	33	32	41	31	34	38	35
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Figure I
Collection Stations Area M-2



- ♂ Uncircled letters are trawl station designation (Special Shrimp Stations include Clear Lake, H, and B.)
- Ⓢ Seine stations (Mud and Taylor Lakes are bar-seine stations)
- Ⓝ Gill and Trammel Net Stations
- Ⓣ Dredge Stations.