PROXIMATE COMPOSITION OF GULF OF MEXICO INDUSTRIAL FISH

Part 2 - Summer of 1958 Studies

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ABSTRACT

Tables giving the length and weight of 15 species of industrial fish and the protein, oil, ash, and moisture contents of these fish are included in this report. These species are representative of the ones most commonly found in the Gulf of Mexico during the summer season.

INTRODUCTION

Continuing the work begun in the winter of 1958 on the length, weight, and proximate composition of various species of industrial fish caught in the Gulf of Mexico, the same type of data now has been obtained for 15 species commonly found during the summer months (June, July, and August) in this region. Protein, oil, ash, and moisture contents, and also length and weight data of these fish thus far have been determined for the winter, spring, and summer seasons.

Some of these constituents--particularly oil and moisture--tend to change markedly in most species from season to season. It is necessary, therefore, not only that these data be known for each species, but that they also be known for each species in each season.

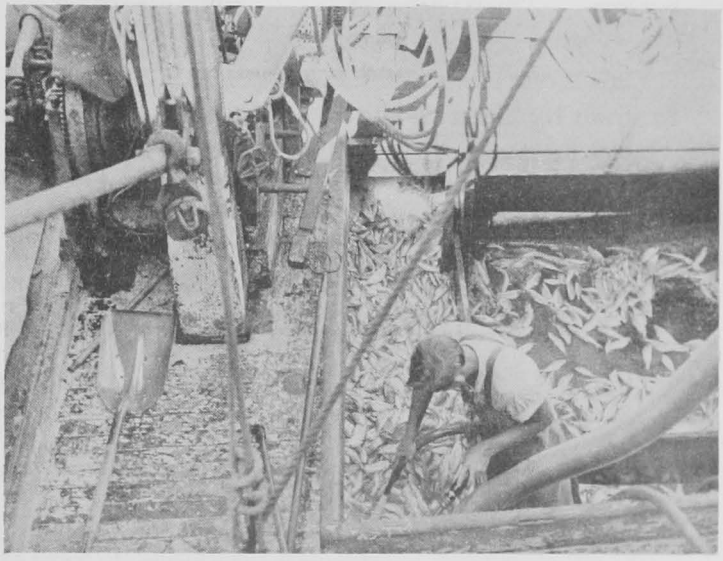

Fig. 1 - Industrial fish being unloaded at a Pascagoula, Miss., dock with a "fish pump."

SAMPLES

All of the samples were industrial fish landed in Pascagoula. The fish had been well iced from 1 to 3 days prior to being collected by laboratory personnel. Upon receipt, the fish were frozen and stored at -20° C. (-4° F.) until analyzed.

Table 1 - Location of Catch and Physical Measurements of Industrial Fish Commonly Caught in the Summer

Common Name	Scientific Name	Caught (1958)	Location	No. of Fish in Each Sample	Type of Measurement	Length		Weight	
						Range	Average	Range	Average
						(Centimeters)		(Grams)	
Anchovies	Anchoa hepsetus	June	Breton Island	14-16	Forktail	10.1-11.8	10.8	8.4- 19.4	12.3
Bumper	Chloroscombrus chrysurus	July	Cat Island	2	Forktail	15.4-17.2	16.5	50.7- 71.1	61.0
Butterfish	Poronotus triacanthus	June	Grand Isle	2-4	Forktail	9.7-15.0	11.6	19.0- 90.9	42.2
Croaker (June)	Micropogon undulatus	June	Grand Isle	2	Over-all	17.9-21.0	19.4	65.6-111.3	88.1
Croaker (July)	Micropogon undulatus	July	Cat Island	2	Over-all	20.2-26.0	22.2	81.4-181.7	118.5
Hardheads	Galeichthys felis	June	Grand Isle	1	Forktail	22.1-24.2	23.3	149.8-204.2	182.6
Harvestfish	Peprilis sp.	July	Cat Isle	1-2	Forktail	13.0-16.2	14.8	83.9-129.9	111.2
Menhaden	Brevoortia sp.	Aug.	Chandeleur Island	1-2	Forktail	15.9-19.5	17.4	82.2-161.4	110.3
Razorbellies	Harengula pensacolae	June	Breton Island	4	Forktail	11.0-15.0	12.9	22.8- 60.1	37.5
Silver eels (cutlassfish)	Trichiurus lepturus	June	Grand Isle	3	Over-all	38.3-54.7	48.5	26.4- 99.8	62.5
Spots	Leiostomus xanthurus	July	Cat Island	2	Forktail	17.7-19.5	18.5	84.7-112.3	98.3
Star drum	Stellifer lanceolatus	June	Horn Island	9-10	Over-all	10.9-13.9	12.5	10.8- 29.4	20.2
Threadfin	Polynemus sp.	July	Cat Island	8	Forktail	10.4-12.2	11.3	15.9- 27.9	20.7
Thread herring	Opisthonema oglinum	Aug.	Cat Island	1-2	Forktail	18.1-18.8	18.5	89.0-109.9	100.1
White trout	Cynoscion sp.	July	Cat Island	1-2	Over-all	17.6-29.9	22.2	55.1-128.0	87.8

Note: Data on the proximate analyses of these fish are found in table 2.

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PHYSICAL MEASUREMENTS

Measurements of length and weight were obtained on the fish after they were thawed.

The measurements of length were of two types. Those species with a well-defined forked tail were measured from the tip of the mouth to the apex of the angle

Table 2 - Proximate Composition of Industrial Fish Commonly Obtained in the Summer

Common Name	Scientific Name	No. of Fish in Each Sample	Protein		Oil		Ash		Moisture	
			Range	Average	Range	Average	Range	Average	Range	Average
			(Percent)							
Anchovies	Anchoa hepsetus	14-16	17.1-17.3	17.2	2.2- 3.3	2.6	3.20-3.44	3.29	76.9-77.6	77.3
Bumper	Chloroscombrus chrysurus	2	18.6-18.9	18.7	4.8- 6.9	6.0	3.42-5.15	4.22	70.3-73.0	71.3
Butterfish	Poronotus triacanthus	2-4	15.0-15.9	15.6	4.9- 7.4	6.2	1.49-3.12	2.36	74.2-78.5	76.0
Croaker (June)	Micropogon undulatus	2	15.6-16.3	15.9	6.3-10.0	8.6	4.29-5.60	4.85	67.1-73.0	69.9
Croaker (July)	Micropogon undulatus	2	16.4-16.9	16.7	2.8- 4.5	3.6	2.37-3.41	3.05	75.0-77.8	76.0
Hardheads	Galeichthys felis	1	16.6-17.5	17.0	6.1- 7.2	6.7	2.70-5.06	4.14	70.5-72.1	71.0
Harvestfish	Peprilis sp.	1-2	16.1-16.8	16.4	4.8- 9.0	7.5	2.08-2.69	2.31	70.4-76.9	73.0
Menhaden	Brevoortia sp.	1-2	14.1-16.1	14.9	13.1-20.5	17.8	3.30-4.08	3.66	60.5-66.8	63.3
Razorbellies	Harengula pensacolae	4	17.1-18.9	18.4	4.4- 5.4	5.0	3.64-5.61	4.81	70.9-73.4	71.8
Silver eels (cutlassfish)	Trichiurus lepturus	3	15.9-16.6	16.3	2.3- 2.8	2.6	1.90-2.91	2.26	77.2-78.8	77.9
Spots	Leiostomus xanthurus	2	14.8-15.6	15.2	11.6-13.7	12.9	2.85-3.78	3.39	67.1-70.4	68.1
Star drum	Stellifer lanceolatus	9-10	14.4-15.2	15.0	3.4- 4.0	3.8	3.89-4.28	4.11	75.1-76.9	76.3
Threadfin	Polynemus sp.	8	16.9-17.6	17.3	1.6- 2.1	1.8	3.52-4.15	3.98	76.2-77.3	76.6
Thread herring	Opisthonema oglinum	1-2	18.3-18.8	18.6	3.2- 3.9	3.5	2.76-4.19	3.27	73.4-75.2	74.4
White trout	Cynoscion sp.	1-2	17.0-18.1	17.5	3.3- 6.3	5.0	2.56-3.76	3.09	73.1-76.5	74.3

Note: Data on the physical measurements of these fish are given in table 1.

formed by the two sides of the tail. This measurement is referred to as "forktail." Those species with a more-or-less blunt tail were measured from the tip of the mouth to the farthest end of the tail. This measurement is referred to as "over-all."

The measurements of weight were made by means of a double-beam pan balance.

The data are given in table 1.

PROXIMATE COMPOSITION

Details of the methods of proximate analysis used were reported in the first paper in this series (Thompson 1958).

Results of the present analyses are shown in table 2, and seasonal changes in oil and moisture contents are shown in table 3. Changes in protein and ash contents

Table 3 - Seasonal Changes in Oil and Moisture Contents

Common Name	Scientific Name	Change in Oil Content			Change in Moisture Content		
		Winter to Spring	Spring to Summer	Winter to Summer	Winter to Spring	Spring to Summer	Winter to Summer
		(Percent)					
Anchovies	Anchoa hepsetus	+ 0.4	- 0.4	0.0	- 1.0	+ 1.7	+ 1.6
Butterfish	Poronotus triacanthus	+ 0.1	+ 3.9	+ 4.0	+ 1.4	+ 4.7	- 3.3
Croaker 1/	Micropogon undulatus	+ 6.4	- 5.0	+ 1.4	- 7.3	+ 6.1	- 1.2
Razorbellies	Harengula pensacolae	-	-	- 2.7	-	-	+ 4.7
Silver eels (cutlassfish)	Trichiurus lepturus	-	-	- 1.7	-	-	+ 2.5
Spots	Leiostomus xanthurus	+11.0	- 3.6	+ 7.4	-12.6	+ 4.2	- 8.4
Thread herring	Opisthonema oglinum	- 3.1	- 1.5	- 4.6	+ 1.1	+ 4.0	+ 5.1

1/ The time intervals for the croaker were as follows: winter to early summer, early summer to late summer, and winter to late summer.
Note: These estimates are based on only a few samples. Although they represent the best presently-available knowledge, further studies may change them markedly.

are not presented because they were relatively small. Discussion of the results will be deferred until the fish can be sampled more extensively.

To obtain a completely reliable estimate of the proximate composition of fish requires a large number of samples of each species, a large number of fish in each sample, and a sampling period covering several years (Stansby 1954). Unfortunately,

other than the findings of Lee, Nilson, and Clegg (1955) and of the present studies, the literature has little information of the proximate composition of Gulf of Mexico fish. The fish-meal and pet-food industries, however, need this information to guide their manufacturing operations. Even the relatively small amount of data available here should, therefore, be of help.

LITERATURE CITED

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FIDDLER CRAB

Fiddler crabs are cosmopolitan inhabitants of our marine and brackish water shores and therefore attract the curiosity of both layman and scientist.

Nearly 30 species of fiddler crabs are recognized along both coasts of North and Central America. The banks of almost every sluggish, brackish water display fiddler burrows from the fresh headwaters to the sea. Shallow muddy or sandy tidal flats often contain large populations of these animals. Salt-marsh areas may support the burrowing and feeding activities of several species within a suprisingly small area.

The fiddler's burrow is excavated above or within the tide marks. Burrowing depth appears to be greater in areas above the high tide line with some holes extending several feet beneath the surface. The digging of a burrow is a solitary effort on the part of its inhabitant and serves as its home for periods of from several hours to a week or more. Crabs normally leave their burrows during low tide to feed along the water's edge, but when the tide floods back most species return to the burrow and plug the entrance with a bit of mud. Very young crabs apparently do not burrow but run freely in and out of the holes occupied by adults.

Perhaps the most distinctive feature of the fiddler is the grotesque enlargement of one of the claws. This large claw identifies only the male and plays an important part in courtship behavior. During breeding season the color patterns of the upper parts of the body and claw of the males assume brilliant multicolored contrasts. At this time the male apparently abandons feeding and stands on tiptoe at the mouth of his burrow waving the large claw with a rhythmic beckoning motion. He may continue this activity for days before a female is attracted. The regular motion of the claw evidently has reminded many an imaginative naturalist of a violin virtuoso bowing his instrument.

The large claw is seldom, if ever, used in feeding. Fiddler crabs seem to feed on minute particles of organic debris and the tiny organisms that are associated with such material. This food is conveyed to the mouth parts in bits of mud which are picked up by the small claw. Structures around the mouth are covered with fine bristles that separate the edible material from the mud and leave the latter free to be expelled in tiny pellets.

The mating of fiddler crabs takes place in late May or early June in the Delaware area. The female deposits several thousand eggs in a protected spot beneath her abdomen where they are cemented to fine hairs on the appendages. Although she carries this egg mass out of the water, she regularly "washes" the eggs to prevent drying and to provide oxygen for the developing embryos. The eggs mature during the late summer and early fall when the larval forms or zoeas are hatched into the water.

The young resemble those of most other crabs although the larvae of only a few species of fiddler crabs have been identified. Fiddler crab larvae are free-floating members of the zooplankton until the following spring, by which time they have passed through at least one more developmental stage and have lost the ability to remain suspended in the water. Their general body form is now much like that of the adult, and the acquisition of protected gills and certain unique physiological mechanisms has prepared them for an amphibious life.

The fiddler crab plays a most interesting and integral part in the economy of our tidelands. The fisherman is generally familiar with their use as bait; they are popular dinner fare for herons, egrets, sandpipers, gulls, lizards, and raccoons; their planktonic larvae doubtlessly represent a major diet item for many species of fish; and the amount of nutrient material that the adults release from marshlands must be comparable to that freed by earthworms from tillable land. The contribution of this little animal to our welfare is not limited, however, to these items of local interest. The scientist is finding the fiddler an extremely valuable animal for physiological experimentation in research of direct medical value to man.

(Estuarine Bulletin, Autumn 1958, University of Delaware.)

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