

DEVELOPMENT OF A THREAD-HERRING FISHERY IN THE GULF OF MEXICO

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ABSTRACT

Growth of industrial fisheries in the Gulf of Mexico has stimulated a search for supplemental sources of fish for industrial uses. One potential source has been found in the thread-herring stocks of the Gulf. The thread-herring resource is described and efforts of the U. S. Bureau of Commercial Fisheries and the industry to develop methods of fishing for thread herring with lampara and purse seines are reported.

INTRODUCTION

The rapid growth of the industrial fishery of the Gulf of Mexico--due primarily to the growth of the fish-reduction and petfood industries--has resulted in an increasing demand for industrial fish. This demand has created a need for further exploration and evaluation of fishery resources that might be made available for continued industrial expansion and development.

Growth of the fish-reduction industry in the Gulf since 1939 is shown in the landing statistics for menhaden (fig. 1). This growth has been brought about through increased and improved plant facilities, and in recent years, through improved fishing techniques and vessel modernization. Aerial spotting, larger and better-equipped vessels, use of lighter synthetic seines, power blocks, and refrigeration have greatly increased the production capabilities. But production has remained limited to a few months in any one locality and has been subject to serious fluctuations.

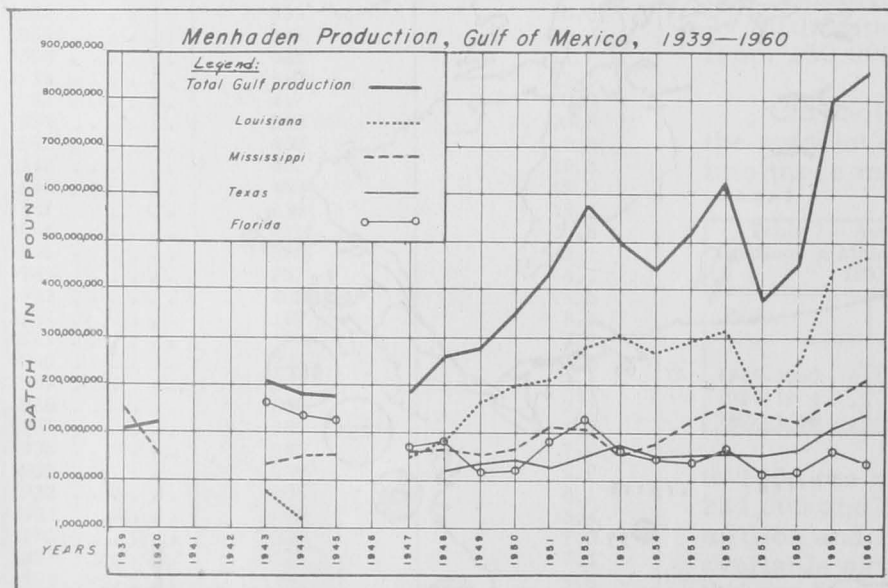


Fig. 1 - The Gulf menhaden industry has shown a relatively constant growth since 1939, but sharp year-to-year and area-to-area fluctuations in production have often created serious problems in maximum utilization of equipment and vessels. Supplementary sources of fish are needed, not only to allow continued increases in production, but also to reduce the fluctuations in production. Missing portions of the graph represent periods for which information is not available.

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Since 1952, several petfood plants have been established along the northern coast of the Gulf of Mexico. These plants process and can catfood from raw material produced primarily by bottom-fish trawlers (Haskell 1961). Approximately 75 percent of the trawl catches, which in 1960 amounted to over 80 million pounds worth \$1.2 million ex-vessel, is made up of croakers, spots, and white trout, with the balance consisting of several dozen miscellaneous species.

Future expansion of the industrial fishery will depend ultimately on the availability and utilization of new resources in new areas, with new or modified equipment and methods. The thread-herring resource appears to offer one promising

avenue for such future expansion. The potential value of this resource to the industrial fishery is indicated by thread-herring catches made recently off the Southeastern States in coastal waters of the Atlantic (table 1) as a supplemental source of fish for the fish-reduction and petfood fisheries. Similar indications have been observed in the Gulf of Mexico where incidental catches have been made from time to time to supplement production of the same fisheries, but no statistics on thread-herring catches are available from the Gulf owing to the highly incidental nature of such catches, and the consequent lack of species breakdown. Thread herring may also aid the fish-reduction industry in stabilizing production and in extending the production period throughout the year as they are present in many coastal waters during periods when menhaden are scarce.

THREAD HERRING

The thread herring, *Opisthonema oglinum*, is a sardine-like fish that ranges from the Gulf of Maine to Rio de Janeiro and is found in great abundance from North Carolina to the West Indies. Between Cape San Blas and Key West, Fla., the thread herring is the predominant species of surface-school fish and a year-round inhabitant, and in all other portions of the Gulf it may be found for at least some portion of the year. The full extent of the population of thread herring in the Gulf is unknown, owing to the absence of either an established commercial fishery or extensive research, but based on observations of schools throughout the Gulf for several years the resource is estimated to be capable of supplying a sizable annual catch.

In general appearance, the thread herring resembles menhaden, scaled sardines (razor bellies), and gizzard shad. The best diagnostic characteristic of the thread herring is the unusually long last ray of the dorsal fin. This characteristic is sufficient to differentiate the fish from menhaden and scaled sardines, and gives rise to the common name of "hairy back," frequently used by commercial fishermen. The gizzard shad, found in both fresh and salt water, has a similar long last ray on its dorsal fin. But the thread herring has scales that cross over the ridge of the back, anterior to the origin of the dorsal fin, whereas the gizzard shad is naked of scales along this ridge. Also, the pectoral fin of the thread herring folds into a groove not found in the gizzard shad.

Several behavior characteristics of thread herring make these fish difficult to catch with standard commercial gear. The schooling behavior is such that at times large schools rapidly divide into smaller groups, and these smaller groups, of 25 tons or less, are extremely maneuverable, fast, and very difficult to encircle. Commercial menhaden seiners prefer to work larger and less maneuverable schools owing to the amount of labor involved in setting their large seines. Thread-herring schools have also been observed to disperse completely in a matter of a few seconds apparently when the fish are highly excited. Adding further to the difficulty, when thread herring are entrapped by a net they tend to charge the webbing and there is a high incidence of "gilling." Finally, thread-herring schools often occur in very shallow water where the deep webbing of ordinary menhaden seines is endangered by contact with the bottom and where the efficiency of these seines is lessened.

For these reasons, as well as the lack of sufficient information on the abundance of fish present, commercial use of the thread-herring resource has been limited, and capture has been incidental to capture of other species.

EFFORTS TO FISH FOR THREAD HERRING IN THE GULF OF MEXICO

In June 1953, the U. S. Bureau of Commercial Fisheries vessel *Oregon* was engaged in exploring for bait resources for use in live-bait tuna-fishing studies. Numerous schools of thread herring were observed in the eastern Gulf during these explorations (Siebenaler 1953) and their presence recorded. Repeated observations of large and numerous schools have been made since by Bureau vessels--in the eastern Gulf in all seasons, and in other Gulf areas through most of the year. Reports of the presence of these large and numerous schools combined with motion-picture records made for reference and shown to members of the industry, has created considerable interest in the resource.

Table 1 - Thread Herring Landings, South Atlantic Coast of U. S., 1956-59 1/

Year	1,000's of Pounds
1959	4,372
1958	109
1957	12,057
1956	5,000

1/ Figures prior to 1956 are combined with menhaden landings.

INDUSTRY LAMPARA-SEINE OPERATIONS--1957-58: Commercial lampara fishing in the Gulf actually began in 1957. In St. Petersburg, Fla., a 35-foot mackerel boat (fig. 2) was equipped with a mechanically-powered gurdy and a West Coast lampara sardine seine to fish for Spanish sardines (*Sardinella anchovia*). These fish were sold as bait for sport fishing. Some schools of thread herring were present in the same areas as the Spanish sardines and small quantities were caught, although little specific effort was given to catching this species because their acceptability as bait was less than that of the Spanish sardines and they are generally more difficult to catch.



Fig. 2 - The Florida lampara-seine operation for sardines. The two wings of the lampara are being brought aboard with the aid of a two-roller gurdy.

The lampara-seine operation was moderately successful during the summer of 1957, but in 1958 the Spanish sardines did not reappear in the St. Petersburg area. Since thread herring were less salable to bait dealers, and industrial markets for thread herring were not explored at that time, little further effort was expended with lamparas, but lampara gear was shown to be of use in catching commercial quantities of thread herring.

The use of lampara seines for thread-herring capture, although shown to be generally efficient, presented several problems: In shoal waters where thread herring are generally found in greatest abundance, the leadline of the conventional lampara seine reaches the bottom before assuming its closed-bottom shape; use of a powered gurdy for retrieving the lampara causes the leadline to lift, creating an avenue of escape for the fish as the seine is hauled through the fairlead at the rail; and tidal conditions sometimes affect the proper opening of the lampara bunt, and make it necessary for the vessel to be positioned downwind from the seine on completion of the set.

BUREAU GEAR TRIALS--1958-59: In the late fall of 1958, in view of industry interest in fishing new industrial fish sources, the Bureau's gear research vessel George M. Bowers was equipped with a hydraulically-powered, two-roller, lampara-seine gurdy (fig. 3) and three types of lampara seines were tried in efforts to correct some of the deficiencies noted in the gear used for thread herring off St. Petersburg. Nets used were: A South African purse-lampara; a tuna-bait lampara; and a "simplified design" lampara. Of the three, the "simplified design" lampara was the most effective for catching thread herring. The "simplified design" lampara is 213 fathoms long with a bunt 33 fathoms long and two wings each 90 fathoms. The bunt is made of $\frac{1}{2}$ - and $\frac{3}{4}$ -inch stretched-mesh

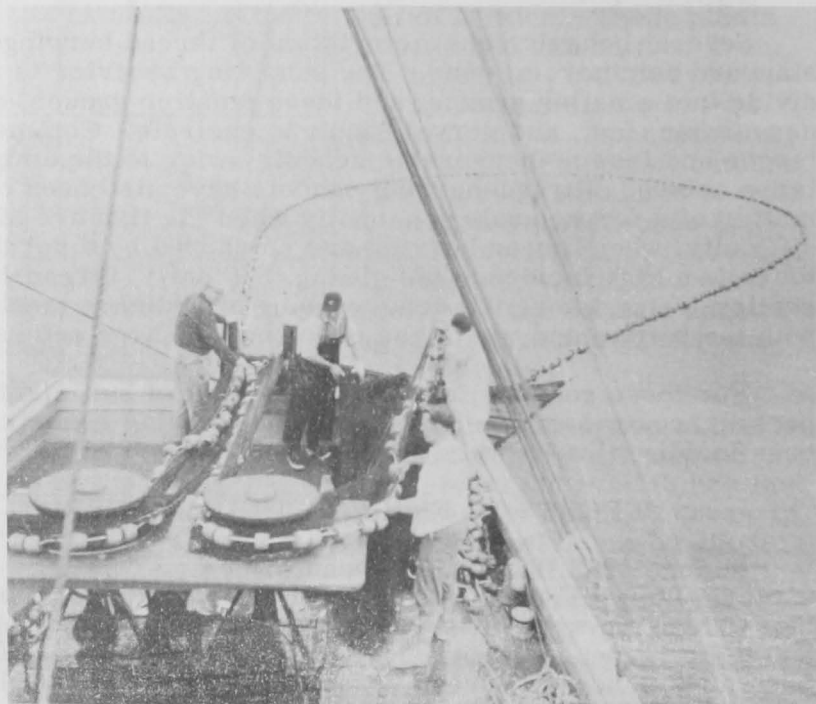


Fig. 3 - Retrieving the lampara seine aboard the George M. Bowers.

webbing and the wings are 4-inch stretched-mesh webbing. The $\frac{3}{8}$ -inch synthetic corkline is buoyed up with 3- by 4-inch cylindrical plastic floats on the center section and 2- by 3-inch tapered plastic floats on the wing sections. A $\frac{1}{8}$ -inch galvanized chain is used for the lead-line. The bunt (fig. 4) is hung full, three feet to one, for maximum "pocket" and the wings are

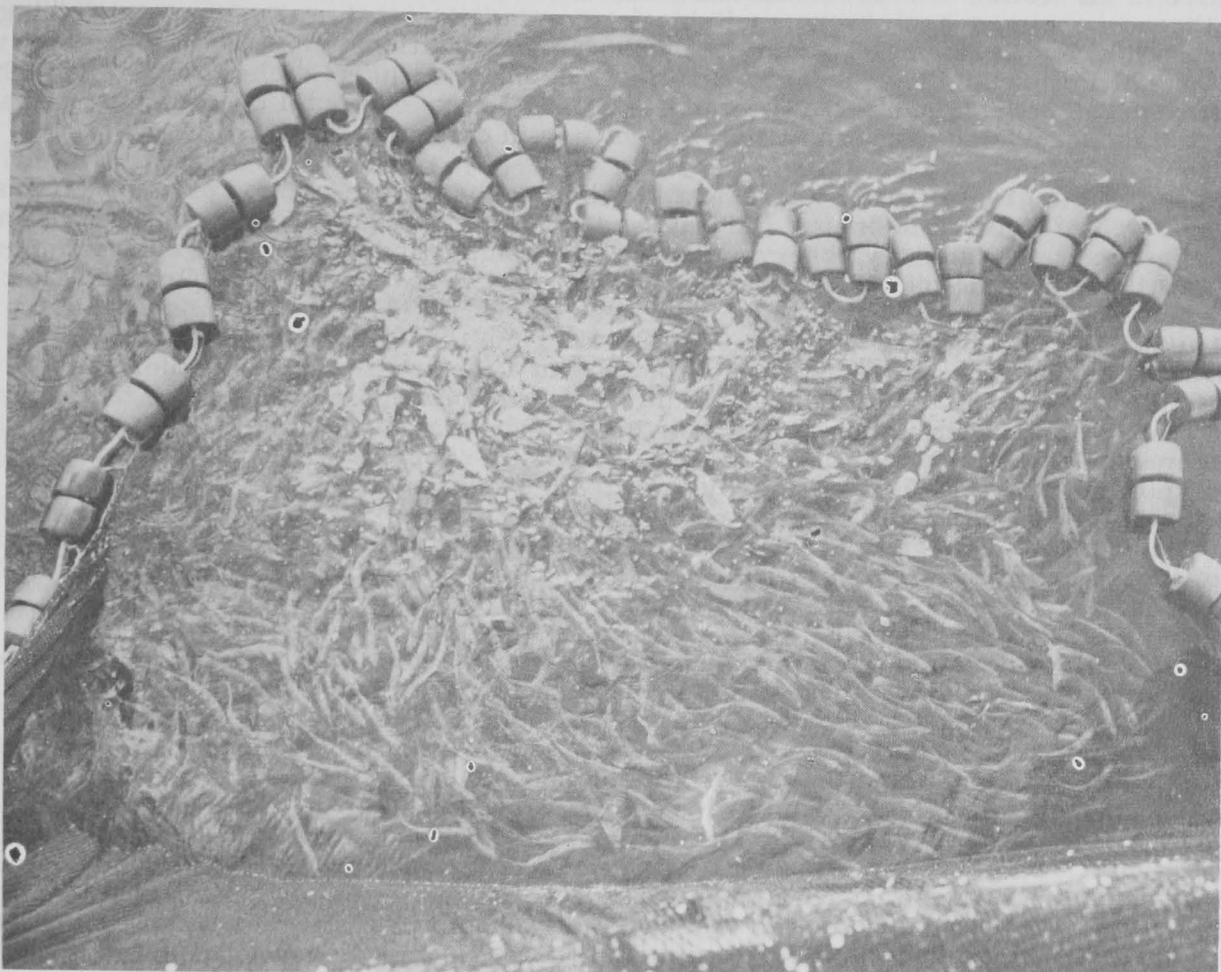


Fig. 4 - Thread herring hardened in the bunt alongside the George M. Bowers.

hung almost straight (6:7) to assure closing of the 4-inch meshes when the net is pulled with the power gurdy.

Development of the "simplified design" lampara helped alleviate some of the problems that faced the Gulf lampara operator--it partially eliminated the opening up of a hole through which the fish could escape when the net was retrieved and it provided a lampara which could be used in shallow water. More important, however, the Bureau's preliminary gear trials, combined with the moderate success of the commercial lampara operation for sardines, encouraged members of the fish-reduction industry of the north Gulf to conduct trials of their own with lampara seines and other gear for thread herring.

INDUSTRY TRIALS WITH LAMPARA SEINES--1958-59: In 1958, a member of the menhaden industry in Pascagoula, Miss., equipped a shrimp vessel with a mechanically-powered gurdy and a 350-fathom lampara seine. The seine was built by a successful West Coast lampara fisherman along the design of lampara seines used on the West Coast for mackerel and sardines. Before seining for menhaden, a crew of Gulf Coast fishermen was sent to San Pedro, Calif., for training aboard lampara vessels in that area. The first experimental lampara seining for menhaden by this unit began during the latter part of the 1958 menhaden season (October-November) off the coasts of Mississippi and Louisiana. As was to be expected

in using gear designed specifically for one fishery in a different fishery, need for modification of design soon became apparent. Minor changes in mesh size, hangings of the corkline and leadline, and size and weight of the leadline were tried without initial success.

Later in the winter of 1958/59 the lampara vessel was moved to the St. Petersburg area where thread-herring schools were available for continuation of this experimental fishing. The thread herring were smaller than the menhaden and additional changes in mesh size were necessitated. Following these changes results were encouraging. Catches ranged as high as 27 tons of thread herring per set. The catches from this experimental operation were transported to Pascagoula and used with trawl-caught fish in canned catfood.

These results created more interest among the menhaden and petfood plant operators in the new source of fishing stocks and the different fishing techniques. Numerous representatives of the menhaden industry observed this new technique, and perhaps of greater importance, saw the abundant schools of thread herring from Clearwater to Boca Grande, Fla.

INDUSTRY TRIALS WITH PURSE SEINES--1958-60: The first-hand observations of the thread-herring resource, made as a result of Bureau efforts, stimulated another vessel operator to attempt fishing thread herring with the standard two-boat purse-seine technique used in the Gulf menhaden fishery. Preliminary efforts were made during the offseason period for menhaden, a period which, in the Gulf, normally occurs between November and April. Lack of knowledge of bottom conditions in the area chosen for trials, use of purse seines designed for deeper water, and the presence of excessive numbers of spiny clams (*Atrina* sp.) caused considerable damage to the purse seines. In spite of these problems, sufficient quantities of thread herring were caught with menhaden seines to encourage resumption of fishing in the same area the following winter season with a different type of purse seine.

Single boat purse seining was introduced in efforts to catch thread herring during the winter of 1959/60. The single-boat technique (Knake 1950) utilizes a single small seine skiff and a larger vessel which carries the seine. When a school is sighted by aerial spotting or spotting from the masthead of the main vessel, the skiff is cast off with one end of the seine made fast to it. The main boat then encircles the school, laying the seine out over its stern. On completion of the circle, the end of the seine is passed back to the main vessel from the skiff and the bunt of the seine, which is at one end, is tied off alongside the vessel on the forward port rail. The seine is then pursed using a ton weight of about 600 pounds, after which the purse rings are brought aboard and the wing is retrieved through a power block hung from the boom. As the wing comes aboard it is restacked on the stern for resetting. The fish are hardened in the bunt by strapping, and are either pumped or brailed into the fishhold. The single-boat purse-seine technique has proven to be the most successful technique used so far for catching thread herring in the eastern Gulf. Rapid pursing, rapid retrieving of the wing, applicability to use with small schools, and the low manpower requirements of this technique make it generally acceptable.

Three small vessels, the largest a 53-foot shrimp vessel, were equipped with this type of gear during the winter season of 1959/60 in the St. Petersburg area. Catches ranged from 5 to 40 tons per set. Adverse weather conditions and nonavailability of freight vessels to transport the catches to a petfood cannery in Pascagoula and a fish-reduction plant in Apalachicola, Fla., limited the operation of these vessels. Approximately 1,400 tons were produced by the three vessels in a period of approximately 4 months, even though the actual fishing time was limited to less than 45 days.

OUTLOOK FOR THE FUTURE

The development of the thread herring fishery in the Gulf of Mexico, as an adjunct of the industrial fish industry, is dependent upon such factors as a stabilized world market for fish meal, oil, and solubles and an increased demand for raw materials for the petfood industry. Thread herring for reduction to fish meal, oil, and solubles have been proven to be of satisfactory quality, and the operation has been shown to be economically profitable under normal market conditions. As raw material for petfood, thread herring are commercially acceptable.

There is also the possibility that thread herring could be packed sardine-style, as a food item. Development of a thread herring "sardine fishery" is dependent upon establishment of facilities and markets. Experimental canning has indicated that thread herring produce an acceptable product when canned in oil, tomato sauce, and other usual types of sardine packs. Continued research and experimental work is being undertaken by the Bureau and the commercial industry to further evaluate the apparent great potential of this source of protein from the Gulf of Mexico.

SUMMARY

The growth of the fish-reduction industry since 1939 and the establishment and growth of the petfood industry in the Gulf of Mexico has created a demand for industrial fish. The presence of abundant stocks of thread herring in the Gulf offers a potential resource as a supplement to existing industrial fish stocks. The exploratory and experimental work of the Bureau and the industry in effecting suitable fishing techniques and gear and the development of uses for thread herring, serve as a foundation for future development of the thread-herring fishery in the Gulf of Mexico.

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BEHAVIOR OF ELECTROLYTIC TINPLATE AS CONTAINER FOR MEAT AND FISH

Beef in gelatin and tuna in olive oil were packed, according to commercial canning techniques, in cans of Ferrostan electrolytic tinplate No. 50, with normal or anodic passivating electrochemical treatment, with or without interior sulphur-resisting lacquer coating. From the technical point of view, this type of tinplate has proved to be quite suitable for canning the two products. From the aesthetical point of view, the tinplate passivated by the anodic treatment, whether plain or lacquered, was found to be unsuitable for canning beef, while only the plain tinplate passivated by the same treatment turned out to be unsuitable for canning tuna. In all the other cases, the sulphite discoloration of the tinplate either was practically absent or did not exceed, in extent and nature, that normally occurring on hot-dipped tinplate cans containing the same products. (Industrie Conserve, vol. 35, no. 1, 1960, pp. 7-11.)