

## LITERATURE CITED

- ABU-NASR, A. M., W. M. POTTS, AND R. T. HOLMAN  
1954. Highly unsaturated fatty acids. II. Fractionation by urea inclusion compounds. *J. Amer. Oil Chem. Soc.*, 31 (1): 16-20.
- DOMART, C., D. T. MIYAUCHI, AND W. N. SUMERWELL  
1955. The fractionation of marine-oil fatty acids with urea. *J. Amer. Oil Chem. Soc.*, 32 (9): 481-483.
- FREEMAN, S. E.  
1942. Fractionating free fat acids such as those of marine oil, soybean oil, linseed oil, perilla oil, tung oil, cottonseed oil, coconut oil, lard, tallow or tall oil. U. S. patent no. 2,278,309, March 31.
- KISTLER, R. E., V. J. MUCKERHEIDE, AND L. B. MYERS  
1946. The commercial solvent separation of fatty acids. *J. Amer. Oil Chem. Soc.*, 23 (5): 146-150.
- KOLB, D. K. AND J. B. BROWN  
1955. Low temperature solubilities of fatty acids in selected organic solvents. *J. Amer. Oil Chem. Soc.*, 32 (6): 357-361.
- MUCKERHEIDE, V. J.  
1954. Production of fatty acids. Separation methods. *J. Amer. Oil Chem. Soc.*, 31 (11): 544-548.
- POTTS, R. H.  
1956. Distillation of fatty acids. *J. Amer. Oil Chem. Soc.*, 33 (11): 545-548.
- PRATT, T. W.  
1953. Liquid-liquid extraction. *J. Amer. Oil Chem. Soc.*, 30 (11): 497-505.
- ROSENSTEIN, L. AND M. M. GORIN  
1957. Process for treating a mixture of saturated and unsaturated fatty acids with expanded urea. U. S. patent no. 2,800,466, July 23.
- SCHLENK, H.  
1954. Urea inclusion compounds of fatty acids. *Progress in the Chemistry of Fats and Other Lipids*. Academic Press Inc., New York, N.Y., 2: 243-267.
- STOFFEL, W. AND E. H. AHRENS, JR.  
1960. The unsaturated fatty acids in menhaden body oil: the C<sub>18</sub>, C<sub>20</sub>, and C<sub>22</sub> series. *J. Lipid Res.*, 1 (2): 139-146.
- SUMERWELL, W. N.  
1957. Liquid-solid countercurrent distribution of fatty acids with urea. *J. Amer. Chem. Soc.*, 79 (13): 3411-3415.
- TREYBAL, R. E.  
1958. Liquid extraction. *Industr. Engng. Chem.*, 50 (3): 463-473.

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## The Multiple-Use Of Shrimp Trawlers

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THE HISTORY OF WORLD FISHING is filled with examples of fisheries which have failed to survive and in most cases the failures have resulted from the inability of the fishermen to make a profit using hand-labor; the Grand Banks baited trawl fishery for cod is an example. How many of the graceful schooners sail each year from U. S. ports?

Any fishery which in these rapidly changing times does not bend constant effort to reducing both man-power and cost will eventually find itself no longer operating. Such is the precise condition of the menhaden industry today. We have some million-dollar menhaden boats but they cannot compete with cheap imported fish meal and the menhaden industry is calling for help. In the past three years we have also heard calls from the shrimp industry for quotas, tariffs and other forms of government aid.

I, in turn, will call for government aid but of a type which will enable the shrimp and menhaden industries to compete with foreign imports without tariffs and quotas. I appeal for money for the U. S. Fish and Wildlife Service to develop and prove once and for all that menhaden and other pelagic fish can be profitably caught with a standard southern shrimp trawler; that at the end of the menhaden fishing season the trawler can quickly convert to shrimping and work the rest of the year, thus taking full advantage of the productive working time of the vessel. In short, to develop true multiple-use of southern shrimp trawlers.

If this is such a simple matter, it might well be asked, why hasn't it been done before? The answer is that it has been done before, many times, but not properly. To a degree, it is being done today by a few boats but is based on obsolete gear. Let us examine some of the pioneer activity in this field.

One of the best-documented efforts to purse-seine with a trawler was the shrimper "Jeff Davis," captained by Carl Carlson for the U. S. Fish and Wildlife Service during the early 1940's. This vessel based at Fernandina Beach and after many months of trial and error succeeded in catching menhaden with a purse seine set off the deck of the vessel, west coast style. This project came to naught, after months of hard work, because war-time fish bailers, who unloaded the boats at the fish factory, threatened to strike if they had to work in the "Jeff Davis" hold—insufficient head-room made it inconvenient.

In 1951 Captain Joe Jett of Reedsville, Virginia, rigged the 110-foot sub-chaser "Sea Hawk" as a west coast seiner but there were gear and crew problems here, also, and the project was given up.

In 1956, after the advent of the powerblock the writer rigged the "Florida Boys," a standard Florida shrimp trawler, with a seine and with a powerblock suspended from the boom. This was what might be characterized as a "poor-boy" project: the owners lent the boat, the powerblock manufacturer lent the net-puller, Wallace Menhaden Products and people like Harry Sahlman, Young Hall and Bill Hardee contributed money. Nassau Fertilizer and Oil Company lent a seine; many others contributed small items of gear. We went fishing with the "Florida Boys," with the greenest crew of purse-seine fishermen ever collected on one deck—and we caught fish. Not many, it's true, but at least we didn't lose the seine. In three days we caught 25 tons of menhaden, solved innumerable problems and learned much—and then our cotton seine fell apart from old age and hard service. So ended the project.

In 1958 Harvey Smith, of the menhaden Smiths, brought the 60-foot "Queen of the Sea" around from the west coast, rigged as a standard west coast purse seiner. This vessel has fished in the Chesapeake Bay area for a year or two but has operated only sporadically and cannot yet be labelled a success.

Let us examine what it is we are trying to do with a small purse seiner; our intention is to surround a school of fish with a fine-mesh seine roughly 1200 feet long by 60- to 70-feet deep. Once surrounded, we must close the bottom

by means of a purse-line, pull the net back on board, pocket the fish in one end and bail them out of the net into the boat. We are, in short trying to replace 20 men in two clumsy purse boats with 5 men on a stable trawler. On the face of it, this seems no difficult task but one factor makes it difficult: the inertia of shrimp and menhaden fishermen who prefer to lie idle at the dock rather than learn new skills.

If we examine the failures of the past we find that only one vessel, the Smith "Queen of the Sea," could be called adequately financed—the others were all "poor-boy" affairs. Another reason most of these trials failed is that commercial fishermen were used as crews. It is axiomatic that experimental fishing must be done by professional experimental fishermen. In many instances, the vessels made mistakes made by their predecessors, repeating mistakes which had been earlier solved. The professionals examine the published literature before they proceed to experiment.

If there have been failures, with such a relatively simple operation, have there been any successes? The answers here is a resounding "Yes." In British Columbia the Canadians captured up to 1,000 tons of fish per set with an almost identical boat. In Peru, similar vessels have flooded the world market with fish meal. Closer to home, Charles Bennett of Apalachicola, Florida, has succeeded in catching thread-herring in commercial quantities with a 62-foot Diesel Engine Sales, Inc. trawler and a powerblock; in New England a standard 67-foot shrimp trawler averages 4,000-5,000 tons of menhaden each year, fishing only 20 weeks.

This last vessel, the "Miss Point Judith," is fished with a seven-man crew, no powerblock, and is captained by Harold Loftes of Wakefield, Rhode Island. Using a modified Gloucester mackerel-seining rig, which employs a towed 40-foot seine boat, the "Miss Point Judith" operates profitably on menhaden and quickly converts to dragging for bottom fish. The Gloucester rig is, however, regarded as obsolete since fewer men can handle the seine by eliminating the large seine skiff and adding a powerblock.

One outstanding success, the only vessel of its kind in the Gulf of Mexico, is the 50-foot steel combination "Cabo Villano II" of Tampico, Mexico. Built like a standard steel shrimp trawler this vessel handles a purse-seine easily and catches mullet, jack crevalle, snook and razorbelly in profitable quantities.

Examining the successes and failures of the past we can formulate several rules for successful multiple-use trials:

1. The work should be done by professional experimental fishermen, i.e., the Bureau of Commercial Fisheries.
2. The trials should be adequately financed and not dependent on revenue from fish caught for continuation.
3. All trials should take advantage of the successes and failures of the past.

It is in order to ask: "What would be the result of developing multiple-use shrimp trawlers—in short, what's the use?" One immediate advantage would be to broaden the bases for both the menhaden and shrimp industries. The menhaden industry could better compete with Peruvian imports; the hard-pressed shrimper, at times facing months of poor production, would be able to profitably operate his vessel.

The answer to this, as in all problems dealing with commercial fishermen,

is that someone must show the way. In the South the only people with the skill and patience required are the men of the U. S. Bureau of Commercial Fisheries. It is up to the fishing industry to make plain to the Fish and Wildlife Service in Washington that they must not overlook the fact (as they sometimes do) that shrimp and menhaden are this country's two greatest fisheries resources, and then it is up to the fishing industry to help Fish and Wildlife get the money needed to implement the experimental fishing.

To the skeptics I merely point out the Pacific Coast tuna industry: three years ago it was almost bankrupt; and spent its time and money with hat in hand begging Congress to protect it from hard-working foreigners just as our shrimp and menhaden industries are doing today. Converting from live-bait boats to purse-seiners, the Pacific Coast tuna fishermen are now prosperous, new boats are again building, and thousands of shrimp trawlers now working will accomplish the same result for the shrimp and menhaden industries.

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## **A Challenge to the Fish Meal and Oil Industry in the Gulf of Mexico**

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THE CLUPEOID OR HERRING-LIKE FISHES constitute the most abundant fishery resource used by man and account for nearly one fourth of the world's total fish production. Historically the herrings have been utilized directly as food, but in recent years these fishes have achieved greater importance as the principal raw material of the fish meal and oil industry. The distribution of these fishes is worldwide. Most of the numerous species in the group occur in the ocean where they are principally confined to the coast or at least are not concentrated far from shore.

There are other important characteristics which make the herring-like fishes particularly desirable to the fish meal and oil industry (1) Most of these fishes normally occur in dense schools. Furthermore, they generally school by species, and the individual schools usually consist of fish which are fairly uniform in size. These schooling characteristics facilitate mass production methods of catching, handling, and processing. (2) The herrings are plankton feeders and thus form one of the early links in the food chain; consequently they are among the most numerous fishes. The menhaden, for example, is one of the few fishes that feeds directly on the basic food producer in the ocean and thus represents a two-link food chain—the shortest possible and uncommon among the fishes in the sea. (3) They grow rapidly and reach maturity early; consequently many species can be utilized at the end of their first year of life and probably afford the maximum yield by the end of their second or third. (4) Many of the clupeoids undertake seasonal and annual migrations which lead them into areas where they can be conveniently caught. (5) Fishes in this group are relatively high in protein and body fat.

Because of these and other characteristics, there is little doubt that the