

## **Larvae of the Pink Shrimp (*Penaeus duorarum*)**

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THIS RESEARCH was performed under contract with the Bureau of Commercial Fisheries. The results will be published by this agency.

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### **Behavior of Shrimp Trawls**

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THIS PRESENTATION was a verbal commentary on a moving picture. The 16 mm. underwater color film may be obtained on loan from the Pascagoula Fishery Laboratory, P.O. Box 630, Pascagoula, Mississippi.

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### **The Shrimp Fishery of Panama**

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*F. A. O. Fishery Officer in Panama*  
AND  
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*Director of the Laboratorio Nacional de Pesca, Panama*

THE FISHERY is located on the Pacific coast of Panama and is mainly exercised within the Gulf of Panama. It started around 1950 with about eight ships and increased rapidly until about 200 vessels were fishing in 1958.

The shrimp landings have risen quickly, together with the rise in number of boats. Because nearly all shrimp are exported, Table 1, giving the exports, demonstrates the development of the fishery. This table suggests a favorable growth but the fishery has become less profitable, especially in the last few years.

The white shrimp has always been the most important type of shrimp in our fishery. However, the big increase in the exports in recent years has been mainly due to *Xiphopenaeus riveti*, the seabob, a much less valuable species. Red shrimp, also occurring in this region, have until very recently only been fished in the dry season, mainly in February and March, in greatly varying quantities. The red shrimp have been partly responsible for the high exports in 1957.

Because white shrimp always have been of preponderant importance, and the landings of this type of shrimp have not increased proportionally with the increase of the fleet, the Panamanian research activities have been concentrated on this group of species. M. D. Burkenroad in 1954 initiated, and during a number of years guided, the collection of information on various aspects of the fishery and biology of white shrimp.

A detailed analysis of the statistical information has been started this year, but has not yet reached its final stage.

For the purpose of this meeting, preliminary estimates of some main statistical data have been made. It should be stressed that these estimates are not

exact, and that all figures presented in this paper are provisional and subject to revision. However, they will be sufficiently close to give a picture of the situation and the problems involved.

The increase in number of boats has been mentioned already. The average number of boats fishing each year has been included in Table 1. Because the boats added to the fleet in the later years were on the average of a larger size, and because of some improvements in fishing technique, it is probable that the fishing intensity increased even more than the number of boats indicates.

TABLE 1

PANAMA—NO. OF BOATS FISHING, AND SHRIMP EXPORTS, IN THE YEARS 1950-1958. (DATA ON EXPORTS OBTAINED FROM THE CONTRALORIA GENERAL DE LA REPUBLICA, PANAMA).

Year	Average number of boats	Exports in '000 pounds
1950	10	305
1951	33	1,241
1952	70	2,414
1953	86	4,814
1954	85	3,554
1955	85	4,233
1956	105	5,977
1957	162	8,263
1958	205	7,958

Fairly close estimates of the total landings of white shrimp are given in Table 2 (no estimates could be made of the landings in the years before 1954). The table shows an increase of the landings from 1955 to 1956, but no further increase took place after 1956. Data available so far from 1959 suggest that the landings in this year will not surpass the quantity of 1956.

TABLE 2

QUANTITIES OF WHITE SHRIMP LANDED IN PANAMA

Year	Quantity in million pounds
1954	3.3
1955	3.3
1956	4.5
1957	4.2
1958	3.7

As a result the catch per boat has shown a considerable decline. The average catch per boat per day in one of the main fishing areas, calculated for boats of sizes between 50 and 60 feet, gives a picture of this decline, which reflects the decrease in density of the shrimp stocks (Table 3).

Although the fact that the increase in fishing intensity was accompanied by a decrease in the catches per boat suggests that the fishery itself has caused this decrease, it still is possible that natural circumstances are mainly responsible for the decline in the shrimp stocks, and therefore for the lower catches.

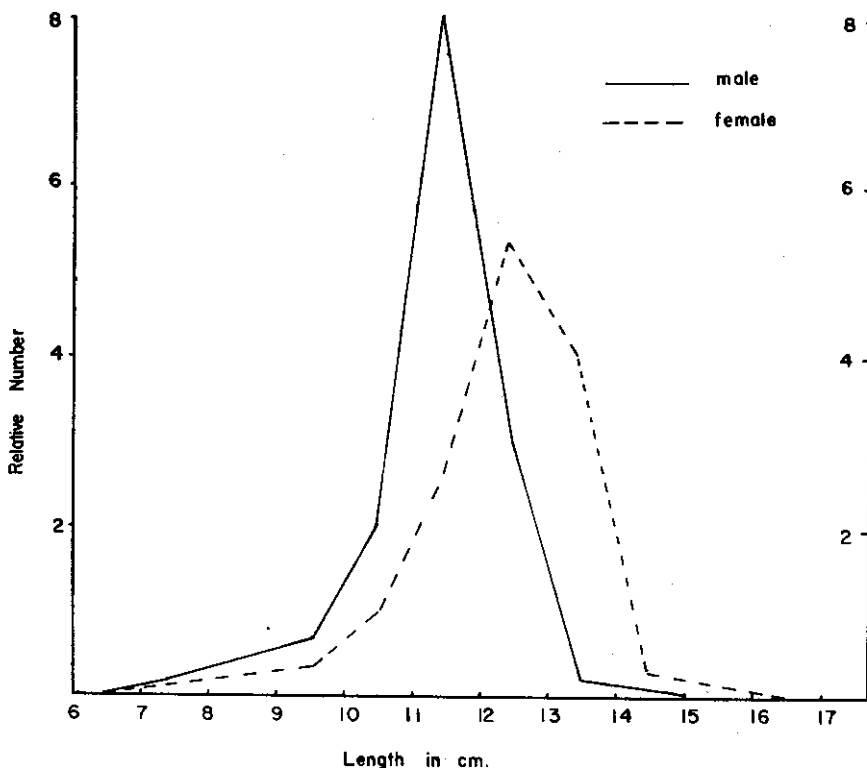
If the fishery has a great effect upon the stocks, it may theoretically be ex-

**TABLE 3**  
**AVERAGE CATCH PER DAY'S ABSENCE, OF WHITE SHRIMP IN THE AREA EAST**  
**FROM PANAMA CITY, CALCULATED FOR SHIPS OF 50-60 FEET LENGTH.**

Year	Catch/day (pounds)
1955	273
1956	233
1957	135
1958	61

pected that this is reflected in a decrease in the size of the shrimp caught. A study of the length composition of the catches might help in the explanation of the decrease.

Samples of the commercial landings have been collected since 1955 to obtain information on the length—and species—composition of the catches of white shrimp. From these samples, it was found that white shrimp in Panama include



**FIGURE 1. *Penaeus occidentalis*—relative length composition of 1955 landings from the area east from Panama City (tail lengths).**

three and sometimes four, species: *Penaeus occidentalis*, *P. stylirostris*, *P. vannamei* and sometimes *P. californiensis*. The samples showed that the species composition is different in different areas. *P. occidentalis* makes up around 90 per cent of the white shrimp catches in the main shrimp area, which is situated in the Gulf of Panama east of Panama City, and around 60 to 70 per cent in the area west of Panama City. About 80 per cent of the white shrimp landings consist of this species.

Only the length composition of *P. occidentalis* will be discussed here.

Figure 1 gives a fairly representative graph of the length distribution of the landings in 1955. The graph shows a steep rise towards the mode, and a steep decline at sizes larger than the mode. The shape of the curve is not affected by rejection; practically all white shrimp caught are landed. This means that at sizes below the mode the fishing mortality is very much lower than at the greater sizes. It is only within a very limited size range, and accordingly during a small part of the life span, that *P. occidentalis* is exposed to the full fishing intensity. And within this size range the numbers show a high rate of decrease with increase in length. Provisional data of the length distribution of the landings in the years 1955-1957 did not show a change in the sizes landed. The analysis has to be completed in more detail before definite statements can be made. The peculiar shape of the length composition curve may show that even an intensive fishery has only slight influence on the length composition of the catches. However, the available data on length composition have not definitely demonstrated that the fishery really has caused the decline in the catches. The analysis will be continued, and it is hoped that in the near future field experiments can be started, including a tagging program.

One other approach which may help in the interpretation of the data is a comparison of the course of the fishery in various countries. Mr. R. W. Ellis, F.A.O. Fishery Officer in Ecuador, has provided data on the shrimp fishery in that country. The species fished are the same as in Panama. A detailed analysis of the statistics is being made, but are not yet available. However, a table of the number of boats fishing and the total exports, comparable with our Table 1, is given in Table 4. In Ecuador, the landings of seabob seem not to have increased to such an extent as in Panama, with the effect that the exports are not so much affected by this species. Therefore, the table gives a general picture of the white-shrimp fishery. It appears that, just as in Panama, the increase in the number of boats has not been accompanied by a similar increase in landings, with the effect that the landings per boat have decreased considerably.

It will be very interesting to compare the data presented here with those of

TABLE 4  
ECUADOR—NO. OF BOATS FISHING, SHRIMP EXPORTS, AND CATCH PER BOAT  
IN THE YEARS 1955-1958.

Year	No. of boats	Shrimp exports (in '000 pounds)	Average catch per boat ('000 pounds)
1955	18	2,307	128
1956	30	2,895	99
1957	60	4,067	68
1958	120	4,438	37

neighboring countries where the development of the fleet has shown a different picture in these years. Those data, however, are not yet available.

Mr. Ellis is now working in Guatemala and El Salvador. It is the intention to adopt standard methods in the shrimp research programs in each of the countries concerned, to obtain comparable results. It is hoped that further regional cooperation will develop in the future.

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## **A Plan to Provide a Larger Market for Shrimp in the United States**

WILLIAM R. NEBLETT

*Executive Director, National Shrimp Congress*

AT THIS MOMENT the shrimp industry is faced with many vexing problems. Not since the low year of 1954 have there appeared to be so many difficulties.

From a point of very low production just a few months ago, we are now entering a better production period, only to be met with very low ex-vessel prices. No one in his right mind would want to see shrimp at a dollar a pound again. The reaction is too violent in the opposite direction when buyers balk and prices plummet downward. However, the fisherman must receive a living wage and have an opportunity to pay his insurance and amortize his investment. This depends on a fair price for shrimp boatside.

A third problem is the over-supply of boats. Efforts are now being made to find diversification for some boats in the production of trash fish, meal, fish oil, etc., but this is slow going. Where 300 boats could make a living, say at Tortugas, 600 boats just divide the same catch, so the catch-per-effort drops to make it uneconomical for all hands. In the normal course of events, we shall again resume the replacement of aging and obsolete vessels.

The unrestricted flood of imports from almost 50 different countries has increased inventories and served as a fulcrum to further depress prices and make the future more unstable. The National Shrimp Congress has sponsored legislation seeking to provide for an orderly development in shrimp imports over the years. This is not aimed at those friendly neighboring countries which have helped the United States producer to build the U. S. market. Shrimp are so universal that almost any country which may decide that it needs U. S. dollars can take its shrimp, perhaps now being used to furnish necessary protein food for its hungry people, and dump them on our market for that desirable dollar. And they may take that dollar and buy radios from West Germany, but our free-traders merrily have ignored this significant situation until just recently. But it is obvious that these under-developed countries can find labor at nine to thirty cents a day, or better-developed countries can subsidize their own industries, as has Japan, to drive the American producer out of business and eventually take over the market under their own terms and conditions. Such a procedure would not be new in this rough international fish business.

When the supply of shrimp is unusually light, exceptional profit-making opportunities bring the butcher, the baker and the candle-stick maker into the business—more vessels, new firms, new plants. Then we achieve a reduced catch per operating unit, because no new grounds are really available for exploitation.